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March 30, 2002

Utah Coal Regulatory Program  
Division of Oil, Gas and Mining  
1594 West North Temple, Suite 121 0  
Box 145801  
Salt Lake City, Utah 84114-5801

Attention: Ms. Pamela Grubaugh-Littig

Re: **Submittal of Annual Report for 2001, PacifiCorp, Trail Mountain Mine,  
C/015/009, Cottonwood Mine, C/015/019, Deer Creek Mine, C/015/018, Des-  
Bee-Dove, C/015/017, Emery County, Utah.**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company as mine operator, herewith submits two copies of the Annual Hydrologic and Subsidence Reports for 2001. The General Section, including all forms and activities of the above mines related to coal mining and reclamation monitoring during the 2001, including the Vegetation report will be submitted on or before April 1, 2002 (refer to Annual Report-General Section extension request dated March 29, 2002).

If there are any questions or concerns please call Dennis Oakley at 687-4825.

Sincerely,

Charles A. Semborski  
Geology/Environmental Supervisor

cc: Carl Pollastro  
(File)

## File in:

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DIVISION OF  
OIL, GAS AND MINING

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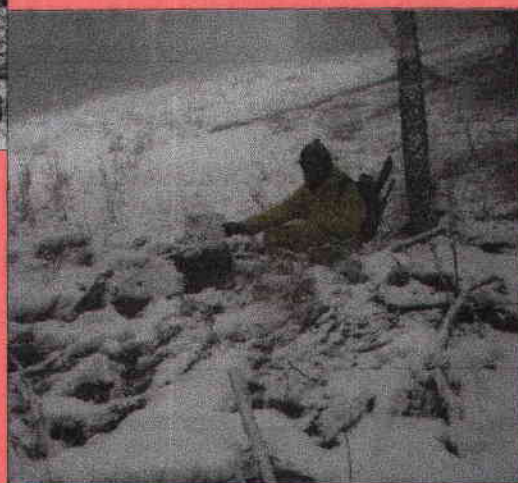
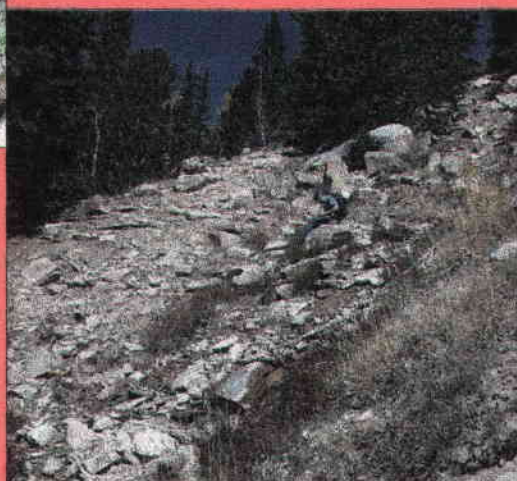
# PACIFICORP

**COTTONWOOD MINE**  
**C/015/019**

**DEER CREEK MINE**  
**C/015/018**

**DES-BEE-DOVE MINES**  
**C/015/017**

**TRAIL MOUNTAIN MINE**  
**C/015/009**



**ANNUAL HYDROLOGIC REPORT**  
**2001**



**PACIFICORP – ENERGY WEST MINING COMPANY  
HYDROLOGIC MONITORING PROGRAM  
ANNUAL REPORT FOR 2001**

**APRIL 2002**

**Submitted to:  
United States Department of the Interior Bureau of Land Management  
U.S.D.A. - Forest Service: Manti-LaSal National Forest  
Utah Division of Oil, Gas and Mining**

**Prepared and submitted for PacifiCorp by:**

**HydroResources Division**

**and**

**Energy West Mining Company**

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## I. INTRODUCTION

The 2001 Hydrologic Monitoring Report is hereby submitted in accordance with the U.S. Department of Interior, Office of Surface Mining requirements and the Utah State Division of Oil, Gas and Mining guidelines for hydrologic monitoring in areas of and adjacent to coal mining operations.

This is the twenty fourth annual hydrologic report submitted by PacifiCorp since the report entitled "Monitoring of the Water Resources in the Mining Areas of East/Trail Mountain, Emery County, Utah" was submitted to the U. S. Geological Survey and the Utah Division of Oil, Gas and Mining in December 1977. It addresses flow observations and water quality characteristics of the water resources adjacent to PacifiCorp's mining areas in Emery County. (See Figure 1, A & B.)

Information was compiled the past year from in-house as well as from state and federal agencies and private sources as follow:

- U. S. Geological Survey
- U. S. Forest Service
- U. S. Department of Commerce, National Weather Service
- Utah Division of Oil, Gas and Mining
- Utah Division of Environmental Health
- Huntington-Cleveland Irrigation Company
- Emery Water Conservancy District
- Cottonwood Creek Consolidated Irrigation Company

Information from outside agencies will continue to be utilized each year for as long as their data gathering programs continue. As a result, cooperative effort is realized and duplication of effort and expense is substantially reduced.

## II. CLIMATIC OBSERVATIONS

In general, runoff and subsequent water supplies are a direct function of the climatic conditions in any given area. Furthermore, the significance of the weather affecting the flow characteristics of the East/Trail Mountain springs cannot be over-emphasized.

Most of the water supply in the Western United States originates in the high mountain ranges as snowfall during winter periods. Snowmelt augmented by spring precipitation produces runoff which is utilized downstream. Fall precipitation influences soil moisture conditions prior to snowpack accumulation and has a bearing upon runoff the following year.

### A. Regional Climatology

From 1982 to 1984 the Western United States, especially Utah, experienced an unprecedented wet cycle of precipitation. The pattern changed in 1985 with conditions returning to slightly above normal. During the 1986 water year, the extremely wet trend returned, and the upper Colorado River Basin experienced above average precipitation. The 1987 weather pattern changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal. The drought continued from 1988 through 1992 with runoff amounts much below normal for six consecutive years. 1993 runoff improved substantially with above average flow conditions occurring in most river basins. 1994 brought the return of drought conditions throughout the West. The 1995 through 1999 water supplies were much improved with above average runoff in Emery County. In 2000, weather conditions changed dramatically and the resulting runoff was much lower than normal. Precipitation was variable during 2001 and runoff values continued below normal though 2001

### B. Local Climatology

#### 1. Precipitation

Precipitation in Emery County during 2001 was variable. The valley reporting station of Hunter Plant was above normal. The precipitation at the East Mountain weather station was slightly below normal, while the Electric Lake station was slightly above normal.

Precipitation amounts recorded at Hunter Plant, Electric Lake, and East Mountain for the 2001 water year (October 2000 to September 2001) will be presented since these sites include low elevation, and two high elevation observation sites in the immediate vicinity of mining activities. The values are shown in Table 1. Huntington Plant discontinued weather observations in May 2001 and will not be included in the analysis.

A comparison of precipitation for 2000 and 2001 merits consideration in this study. The intent is to develop a correlation between yearly precipitation and spring discharges on East and Trail mountains. Table 2 is a comparison of the 2000 and 2001 precipitation levels recorded at the four locations.

Tables 3, 4, 5, and 6 indicate monthly precipitation values at Hunter, Huntington, Electric Lake, and East Mountain from the beginning of operation at each site. The tables indicate monthly trends as well as the great fluctuation in yearly totals. Figure 2 shows monthly precipitation at the East Mountain site for the 2001 water year.

The correlation of precipitation levels with spring discharges will be discussed in the East/Trail Mountain Springs section of this report.

## 2. Temperatures

During the 2000 water year temperatures were much above normal at the Hunter Plant, East Mountain and Electric Lake. Temperatures at the Hunter Plant station were above normal for all months during the year. At the East Mountain station temperatures were above normal for all months during the year. Temperatures at the Electric Lake station were above normal except for November, December, January and July which were below normal. (See Table 7.)

A comparison of 2000 and 2001 temperatures for the four stations is addressed since temperatures also influence water supplies from year to year. Table 8 depicts the variation and compares 2000 to 2001.



### III. DRAINAGE SYSTEMS

The surface drainage system on East Mountain is divided into two major drainages; the southwest portion forms part of the Cottonwood Creek drainage, and the northeast portion contributes to the Huntington Creek drainage. (See Map HM-1 in pocket.) The drainage boundaries, including minor subdivisions to Cottonwood and Huntington creeks, are designated on the accompanying map. The surface drainage system on Trail Mountain is totally contained within the Cottonwood Creek drainage system, with minor subdivisions flowing to Indian and Cottonwood Canyon creeks. (See Plate 7-2 in pocket.) Both Huntington and Cottonwood creeks flow out of the Wasatch Plateau in a southeasterly direction. The creeks merge with Ferron Creek to form the San Rafael River, which is a tributary of the Green River.

#### A. Huntington Creek Drainage System

Huntington Creek is comprised of many smaller tributary streams that feed the main stream. Deer Creek, Meetinghouse Canyon, Mill Fork Canyon, and Rilda Canyon creeks are the only tributaries to Huntington Creek that emanate from within PacifiCorp's coal mine permitted area.

##### 1. Huntington Creek

Flow data are recorded on a continuous basis by PacifiCorp at four locations; stations are located near PacifiCorp's Huntington Plant, Huntington Plant Diversion, below Electric Lake about 22 miles upstream from the Huntington Plant and Electric Lake elevations. Flow records are maintained by PacifiCorp in order to determine water entitlements and reservoir storage allocation for the various users on the river.

Table 9 shows a summary of actual Huntington Creek flows below Electric Lake and at Huntington Plant, and calculated natural flow at Huntington Plant. The calculated natural flow considers actual flow recorded at the plant, plant diversions, Electric Lake storage change, and lake evaporation. The average daily discharges for the 2001 water year (October 2000 - September 2001) at the two stations and Electric Lake storage are found in Appendix A.

During the 2001 spring runoff period (April through June) 4,424 acre feet of water was impounded behind Electric Lake Dam. During spring runoff the impoundment reached its highest level on June 4. Total storage on that date amounted to 21,035 acre feet, which is 10,209 acre feet below full capacity. Reservoir releases for fishery, irrigation, flood control, and Huntington Plant needs during the water year totaled 14,992 acre feet. The total flow of 40,090 acre feet recorded for Huntington Creek at the Huntington Plant is equal to 59% of average. A comparison of runoff values from 2000 and 2001 is presented in Table 10.

During 2001 water quality information on Huntington Creek near the Deer Creek confluence was compiled on a quarterly basis. Locations of water quality sampling stations monitored by PacifiCorp-Energy West Mining Company are listed below (refer to Map HM-1).

- a. HCC01 - Above Power Plant Bridge
- b. HCC02 - Below Deer Creek Confluence
- c. HCC04 - Below Bridge @ Research Farm Bridge<sup>+</sup>

<sup>+</sup> Not listed on map due to scale.

Specific water quality constituents analyzed are shown in Tables 11, 12, and 13. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office. In general, the water shows a gradual increase in concentration of dissolved minerals as the flow proceeds down Huntington Canyon.

## 2. Deer Creek

Deer Creek is an ephemeral tributary of Huntington Creek and flows from the same canyon in which the Deer Creek Mine is located. PacifiCorp monitors the characteristics of Deer Creek according to the following flow and sampling schedule (see Hydrologic Monitoring Schedule Appendix N).

### a. Flow and Sampling Schedule

#### (1) Locations:

- (a) Above the Mine - DCR01
- (b) @ Permit Boundary - DCR04
- (c) Below the Mine - DCR06

(See Map HM-1 in pocket)

#### (2) Flow: Information is collected during the first or second week of each month.

#### (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in March 1988 and will continue through 2002; i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph showing all the data collected for 2000 and 1984-1999 has been generated for each location. (See Appendix B.) The hydrographs show that the flow in the Deer Creek drainage occurred from May through November at DCR01 with peak flow occurring in June (DCR01 - 1,462 GPM). Flow at the lower two locations occurred throughout the year as the result of Deer Creek Mine discharge with peak flow occurring in May (DCR04 - 1,934 GPM, DCR06 - 1,910 GPM).

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2001. Baseline analysis will be repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 14 and 15. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. It is apparent from historical information in the tables that the quality of the Deer Creek runoff degrades slightly from the upper to the lower sampling point. The quality of the lower sampling point is thought to be affected by the Mancos Shale which outcrops above the lower sampling location. Raw data is on file at the Energy West Main Office.

3. Meetinghouse Canyon Creek

Meetinghouse Canyon Creek is an ephemeral tributary of Huntington Creek and is monitored according to the following schedule (see Hydrologic Monitoring Schedule in Appendix N).

a. Flow and Sampling Schedule

- (1) Location: South Fork of Meetinghouse Canyon  
(See Map HM-1 in pocket.)
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:  
Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in March 1984 and will continue through 2002, i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

A hydrograph comparing 2001 and 1984-2000 can be found in Appendix C. Peak flow occurred during the month of May at a estimated rate of 3,700 GPM. Base flow of 0.0 GPM existed during January through April, and December.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2001. Baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1986. Table 16 lists the minimum, maximum, and mean values for 2001 along with historical results. Raw data is on file at the Energy West Main Office.

4. Mill Fork Canyon

Mill Fork Canyon is a tributary of Huntington Creek and was included in PacifiCorp's monitoring program starting in 1997. Monitoring of Mill Fork is conducted according to the following schedule (see Appendix N). Mill Fork Canyon is ephemeral from its headwaters to the western border of Section 21, Township 16 South, Range 7 East, and intermittent from that point to the confluence of Huntington Creek.

a. Flow and Sampling Schedule

(1) Locations:

- (a) Above old mines - MFA1
  - (b) Mill Fork Canyon Culvert - MFB2
- (See Map HM-1.)

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in 1997, and will continue through 2002 on a quarterly basis, i.e., March, June, September, December. Field measurements, including pH, specific conductivity, temperature will be performed quarterly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

Flow information is collected monthly throughout the year (See Map HM-1 for locations.) A hydrograph has been generated for each location. (See Appendix D.) Both recording stations remained dry throughout the year.

c. Quality Information

Historical monitoring data collected by Beaver Creek Coal Company - No. 4 Mine and the United States Geological Survey (site No. 76: Open File Report 81-539) has been incorporated in PacifiCorp's hydrologic database. Operational water quality monitoring was conducted during 1997 and 1998 (refer to the Quarterly Hydrologic submittals). Baseline quality analysis was initiated in November 1998. In accordance with the Hydrologic Monitoring Plan, baseline quality analysis will be conducted for a two-year period, forth quarter 1998 - fourth quarter 2000 (refer to the respective Annual Hydrologic reports). Due to the usual dry conditions, baseline water sample collection will be extended through the year 2002. Thereafter, baseline analysis will be repeated once every five (5) years.

Results of the samples collected in 2001 are presented in Tables 17, and 18. It is apparent from the data that the quality of the water degrades slightly from the upper reaches of Mill Fork, i.e., MFA1 to the mouth of the canyon, i.e., MFB2. Water quality has remained relatively consistent from year to year. (See Tables 17, and 18). Raw data is on file at the Energy West Main Office.

5. Rilda Canyon Creek

Rilda Canyon Creek is a tributary of Huntington Creek and is monitored according to the following schedule (see Appendix N). Rilda Canyon Creek is ephemeral from its headwaters to the western border of Section 28, Township 16 South, Range 7 East, and perennial from that point to the confluence of Huntington Creek.

a. Flow and Sampling Schedule

(1) Locations:

- (a) Right Fork of Rilda - RCF1\*
- (b) Left Fork of Rilda - RCLF1\*\*
- (c) Left Fork of Rilda - RCLF2\*\*
- (d) Rilda Canyon - RCF2\*
- (e) Rilda Canyon - RCF3
- (f) Rilda Canyon - RCW4 (See Map HM-1.)

\* During mining of the North Rilda leases, an additional site was added in 1999 upstream of RCF1 (adjacent to EM-163) to monitor

surface/groundwater relationships. Flow will be measured yearly during base flow conditions.

\*\* Flow and field parameters only.

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in June 1989 except for RCLF1 and RCLF2, which were initiated in 1990 and 1995, respectively, and will continue through 2002 on a quarterly basis, i.e., March, June, September, December. Field measurements, including pH, specific conductivity, temperature, and dissolved oxygen, will be performed at the perennial stream locations, i.e., RCF3 and RCW4, monthly in conjunction with quality measurements. Quantity will be monitored monthly.

#### b. Flow Information

Flow information is collected monthly throughout the year with the use of three Parshall flumes and one V-notch weir. (See Map HM-1 for locations.) A hydrograph has been generated for each flume-weir location. (See Appendix E.) Springs utilized by North Emery Water Users Association (NEWUA) for culinary purposes are situated between monitoring locations RCF2 and RCF3. Flow above the spring area is ephemeral and below the stream is perennial. For location RCF1 flow occurred from May through October with a peak flow estimated at 2,842 gpm in May. Location RCF1 was inaccessible from January through April and November through December. Flow at locations RCLF1 and RCLF2 occurred during the months May through July with a peak flow measured at 100 GPM. For location RCF2 flow occurred during the months of May through August, with peak flow estimated at 2,529 GPM in May and a base flow of 0.0 GPM during the months of January through April and September through December. Below the spring area the stream is perennial and increases in flow from RCF3 to RCW4. During 2001 the peak flow for RCF3 was estimated at 3,118 GPM (May); for RCW4, 3,117 GPM (May). Baseline flow for 2001 at RCF3 and RCW4 was approximately 75 and 125 GPM, respectively. Data suggest that above the NEWUA springs the stream loses water to the alluvium and below the spring area the alluvium recharges the stream causing the flow to increase.

c.      Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 2001. Thereafter, baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1989; results of the samples collected are presented in Tables 19, 20, and 21. It is apparent from the data that the quality of the water degrades from the upper reaches of Rilda Canyon, i.e., RCF1, to the NEWUA spring area, and from that point to the mouth of the canyon, i.e., RCW4. Water quality has remained relatively consistent from year to year. (See Tables 19, 20, and 21.) Raw data is on file at the Energy West Main Office.

B.      Cottonwood Creek Drainage System

The southern portion of East Mountain and the entire Trail Mountain is intersected by Cottonwood Creek and its associated tributaries, including Cottonwood Canyon Creek and Grimes Wash. The Cottonwood Creek drainage is about equal in size to the Huntington drainage, with total discharge from each drainage about 70,000 acre feet per year. The major cultural feature on Cottonwood Creek is Joe's Valley Reservoir, located about twelve miles west of the town of Orangeville. The 63,000 acre foot reservoir was constructed by the U. S. Bureau of Reclamation and provides storage water for irrigation, industrial, and municipal needs in the Emery County area.

PacifiCorp monitors two of the tributaries of the Cottonwood Creek drainage system, Cottonwood Canyon Creek and Grimes Wash. (See Map HM-1 in pocket.)

1.      Cottonwood Canyon Creek

Based on data collected by PacifiCorp, Cottonwood Canyon Creek is an ephemeral stream from its headwaters to Section 24, Township 17 South, Range 6 East and intermittent from that point to its confluence with Cottonwood Creek. The majority of water moving through Cottonwood Canyon Creek appears to be through the colluvial valley deposits. An extensive hydrogeologic investigation was conducted in Cottonwood Canyon Creek during 1992. Results can be found in Appendix C of the PAP. Four (4) permanent runoff sampling sites have been established along Cottonwood Canyon Creek and sampled as listed below. (See Hydrologic Monitoring Plan in Appendix N).

a.      Flow and Sampling Schedule

- (1)      Locations: (See Map HM-1 in pocket.)
  - (a) Above Mine - SW-1
  - (b) Below Mine - SW-2
  - (c) @ USGS Flume - CCC01\*
  - (d) Above Straight Canyon - SW-3
- (2)      Flow: Information is collected during the first or second week of each month.



(3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in December 1992 and will continue through 2002, i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

\* Flow and field parameters only.

b. Flow Information

As stated above, flow information is collected monthly throughout the year. (See Map HM-1 for flume locations.) A hydrograph for 2001 has been generated for each sampling location. (See Appendix F.) The hydrographs show the intermittent nature of Cottonwood Canyon Creek. Flow at SW-1, occurred from February through November (frozen in December) with a peak and base flow estimated at 175 (June) and <5 GPM, respectively. Flow at SW-2 occurred from January through December with a peak and average base flow estimated at 185 (April) and 40 GPM, respectively. Flow at SW-3 occurred throughout the year with a peak and average base flow estimated at 197 (June) and 40 GPM, respectively. Flows recorded at SW-2 and SW-3 were influenced by discharge from the Cottonwood Mine.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2001. Thereafter, baseline analysis will be repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 22, 23, and 24. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office.

The Cottonwood Canyon Creek drainage quality is influenced by the following factors: 1) A relatively high amount of suspended solids during spring runoff from Indian, Roans, Mill, and Marines canyons; 2) Alluvial/colluvial deposit recharge and discharge areas.

## 2. Grimes Wash

Grimes is an ephemeral tributary of Cottonwood Creek and flows in the same canyon in which the Wilberg/Cottonwood Mine is located. Three permanent runoff sampling sites were established in 1980 and are sampled as listed below (see Hydrologic Monitoring Plan in Appendix N).

### a. Flow and Sampling Schedule

- (1) Locations: (See Map HM-1 in pocket.)
  - (a) Right Fork - GWR01
  - (b) Left Fork - GWR02
  - (c) Below the Mine - GWR03
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix N.) The program was initiated in March 1988 and will continue through 2002 i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

### b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph comparing 2001 to the data collected from 1984 through 2000 has been generated for each flume location. (See Appendix G.) The hydrographs show that the Right Fork remained dry throughout the year and flow occurred from April through November in the Left Fork with a peak flow of 192 GPM in June and base flow of <20 GPM. Flow at the Below the Mine location continued throughout the year due to the influence of the springs emanating from the Starpoint Sandstone/Mancos Shale formational contact and Wilberg/Cottonwood Mine discharge (mine discharge May 2001). Peak flow occurred during the month of May at 510 GPM, and baseline flow averaged approximately 10 GPM.

### c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 2001. Baseline analysis will be repeated once every five (5) years. The results of the 2000 operational quality analysis are listed in Tables 25, 26, and 27. The minimum, maximum, and mean

values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office.

The Grimes Wash drainage quality is influenced by two factors: 1) Under normal conditions the Right Fork contributes a relatively high amount of suspended solids during spring runoff due to the fact that it is a south facing canyon dominated by argillaceous sediments; 2) Mancos Shale/Starpoint Sandstone interface seeps and springs elevate the TDS at the Below the Mine location.

#### IV. SPRINGS

##### A. East Mountain

Between the time PacifiCorp began monitoring springs on East Mountain and 1986 the number of springs measured increased from less than fifty (50) to nearly eighty (80). PacifiCorp believed that more benefit could be realized by concentrating its monitoring to selective springs in the areas that will be undermined within the next five years. (See Map HM-5 in pocket.) A meeting was held on March 25, 1987 with the U. S. Forest Service and the Utah State Division of Oil, Gas and Mining to determine the most effective plan for PacifiCorp's monitoring. A subsequent meeting was held on April 15, 1987 with the State Division of Oil, Gas and Mining to finalize the monitoring plan revisions. In addition to major revisions made in 1987, each year a meeting is held with State and Federal agencies to adjust the monitoring schedule based on field investigations.

During the meetings it was resolved that the following springs will be monitored. Eight additional springs (denoted with a plus [+] symbol below) were added in 1989 after the annual field verification process jointly conducted by DOGM and PacifiCorp.

* Burnt Tree Springs	79-40
* Elk Spring	80-41
* Sheba Springs	80-43
Ted's Tub	* 80-44
79-2	* 80-46
* 79-10	80-47
79-15	+ 80-48
* 79-23	80-50
79-24	82-51
* 79-26	* 82-52
+ 79-28	* 84-56
* 79-29	+ 89-60 (Alpine Spring)
79-32	+ 89-61
79-34	+ 89-65
* 79-35	+ 89-66
79-38	+ 89-67
	+ 89-68

Of these springs, twelve will be monitored on a monthly basis, weather permitting, and have been denoted on the above list with asterisks (\*).

1. Flow and Sampling Schedule

a. Flow

All springs on the preceding list are measured during the months of July and October. In addition, a minimum of twelve springs are monitored to establish a discharge recession curve. Generally, measurements are made on a monthly basis during the months of July through October if weather and reasonable access permit; but when historical data indicate that a spring is short-lived, all efforts are made to measure discharge from that spring at least three times, equally spaced, within its flow period.

b. Quality Samples

All springs listed above are sampled for water quality characteristics during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix N.)

2. Spring Flow

Precipitation increased from 2000 to 2001 and spring discharge rates increased from 2000 to 2001, whereas temperature, a critical factor on spring discharge rates, was -0.1 degrees lower in 2001 than the historical average. Precipitation received at East Mountain weather station set a all time low for the 2000 water year. Precipitation rebounded in 2001 but was still slightly below average. East Mountain received substantial precipitation during October, which contributes to the yearly but not to the snowpack, the critical factor in spring outflow. Table 28, is a tabulation of the flow data collected during the 2001 monitoring season. To record the season variation, all springs measured in July are measured again in October. The seasonal variation is represented in Table 28, under the column heading "Seasonal Net Change." The percentage figures represent the amount of change, either positive or negative. The average change reveals a fifty-two percent (52%) [fifty-five percent (55%) by volume] decrease from the July to the October measurements.

An nineteen-year comparison of spring discharge is shown in Table 29. The table includes a year by year comparison of springs identified from each mode of occurrence (Table 30). The springs utilized in the comparison are underlined in Table 30. The flow values for the individual springs represent the July measurements. October measurements were not utilized because winter weather conditions caused some springs to become inaccessible.

Table 29 has been compared to East Mountain climatology to see how closely spring discharge rates follow local annual precipitation. Figure 3 reveals good correlation between spring discharge and precipitation. Along with precipitation, temperature plays a critical role in yearly discharge variations, especially during the early stages of the runoff period. Listed in Table 31 is a comparison of January through June temperature data from surrounding weather stations for the period 1982-2001 versus

departure from normal. The comparison is vital in determining mining effects on spring discharge versus general changes in annual precipitation.

Table 31 clearly demonstrates near average temperatures between 1982 and 1984, but starting in 1985 and continuing through 2000 (except for 1991) positive departure from normal has been significant. In 2001 the temperatures were -0.1 degrees below average. Comparison between spring discharge rate and general changes in annual precipitation patterns correlated well in the past due to relatively normal temperatures experienced during the early runoff period (January through June). Figure 3 not only includes a comparison of spring discharge rate and precipitation as in the past but also temperature departure due to critical influence temperature has on peak discharge occurrence.

An additional flow information study was initiated during the summer of 1985. The purpose of the program is to establish flow recession curves for the following springs: (1) Burnt Tree, (2) Elk Springs, (3) Sheba, (4) 79-10, (5) 79-23, (6) 79-26, (7) 79-29, (8) 79-35, (9) 80-44, (10) 80-46, (11) 82-52, (12) 84-56. The flow information collected during 2000 is shown in Table 32; corresponding spring recession curves comparing 2001 to 1984-2000 are located in Appendix H.

### 3. Quality

To more closely identify springs which are related one with another, water samples were analyzed to determine the percentage of cations and anions in solution. The percentages have been graphically represented as cation-anion diagrams. (See Appendix H.) The purpose of the cation-anion diagrams is to identify groups of related springs by water chemistry. To better visualize the concept, the cation-anion diagrams are presented by the geologic formation in which the spring originates. A general pattern for the Flagstaff and Price River formations can be recognized for each year in which the cations/anions were analyzed. A consistent pattern for the North Horn is less obvious due to the complex geology of the formation itself. One aspect the cation-anion diagrams demonstrate is that, even though the quality varies slightly from individual sites as well as from different formations, seasonal variations do not exist.

The quality of the springs sampled in 2001 reveals an excellent correlation with historical averages. A summary of the water quality analysis for a representative group of East Mountain Springs is presented in Table 33. In the table, the mean values for 2001 are compared to the historical results for each respective spring. Raw data is on file at the Energy West Main Office.

#### B. Rilda Canyon - North Emery Water Users Association (NEWUA)

Of concern to PacifiCorp Energy West is the proximity of proposed mining activities in Rilda Canyon to the Rilda Canyon Springs which currently serve as a culinary water source to the North Emery Water Users Association (NEWUA). The NEWUA spring system consists of a series of collection lines extending westward up Rilda Canyon and southward up a small side drainage (shown on Map HM-8 in Volume 9 of the PAP). The NEWUA spring system is metered at four locations. Meter 1 (Side Canyon Spring) is located at the downstream end of a collection line which enters Rilda Canyon from the South. Meter 2 (Side Canyon Spring plus South Spring) is located near the bottom of the main east-west trending collection line which lies to the south of Rilda Canyon Creek at a point just upstream (west) of the main spring collection box. Meter 2 records combined flows from both the

Side Canyon (Meter 1) as well as additional inflows known as South Spring which enter the system below Meter 1. Meter 3 (North Spring) records flows for the east-west central collection line which was constructed through the central portions of the valley near Rilda Canyon Creek. Meter 4 (North Spring) collects data from the north collection line located on the north side of Rilda Canyon Creek. During 1995 flow from the north collection line was combined with the central collection system. As a result Meter 4 was terminated.

#### 1. Spring Flow

Through the cooperative efforts of PacifiCorp and NEWUA, flow meters were installed in September 1990 to isolate individual spring areas for quantity and quality (see Map HM-8 in Volume 9 of the PAP). Table 34 lists the individual flow rates for meters 2 and 3 (flow from Meter 1 is included in Meter 2).

The seasonal variation of the monthly average flow from NEWUA's Rilda Canyon Springs is shown in Figure 4. With the installation of flow meters, individual spring contribution to the total flow can be plotted over time.

#### 2. Quality

Baseline quality sampling of the individual springs was performed in 2001. The minimum, maximum, and mean results of the 2001 spring flow compared to historical quality analysis are listed in Table 35. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office. As stated in Volume 9 of the PAP, differences in the groundwater quality data reflect differences in the groundwater source or the origin of groundwater for the various springs issuing within the Rilda Springs area. The higher sulfate and TDS concentrations from the Meter 2 samples are characteristic of waters associated with the Blackhawk Formation. Waters issuing from the North Spring collection system (Meters 3 and 4) area are of a better quality than waters from the Side Canyon and South Spring collection areas. Water issuing from the North Spring originates primarily from water moving within the alluvial valley sediments and fracture systems of the Starpoint Sandstone and is not derived from the Blackhawk Formation.

#### C. Trail Mountain

PacifiCorp began monitoring springs on Trail Mountain in 1993. Monitoring prior to 1993 was completed by the previous lease holders. The nine (9) springs listed below are monitored.

T-6 (18-2-1)	T-14 (17-25-1)
T-8 (17-21-1)	T-14A (17-26-5)
T-9 (17-22-1)	T-15 (17-35-1)
T-10 (17-26-4)	T-16 (17-35-2)
TM-23 (17-14-4)	

1. Flow and Sampling Schedule

- a. Flow

All springs on the preceding list are measured during the months of July through October if weather and reasonable access permit.

- b. Quality Samples

All springs listed above are sampled for water quality characteristics during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix N.)

2. Spring Flow

As indicated earlier, precipitation increased and spring discharge rates decreased from 2000 to 2001 (the inverse relationship was due to decreased flow from the Cottonwood Canyon alluvial system). Table 36 is a tabulation of the flow data collected during the 2001 monitoring season. The seasonal variation is represented in Table 36 under the column heading "Seasonal Net Change %." The percentage figures represent the amount of change, either positive or negative. The average change reveals a sixty-two percent (62%) [seventy-six percent (76%) by volume] decrease from July to the October measurements.

A fourteen-year comparison of spring discharge is shown in Table 37. The flow values for the individual springs represent the July measurements. October measurements were not utilized because winter weather conditions caused some springs to become inaccessible.

Cottonwood Spring (TM-23) Data:

On July 31, 1991 a citizen complaint claiming that the mining in the Deer Creek Mine dried up a spring known as Cottonwood Spring was filed by Jim Peacock. According to Mr. Peacock, Cottonwood Spring produced approximately one to three cubic feet/second and was the main source of flow for Cottonwood Canyon Creek (conversation during an on site visit with Utah State Division of Water Rights, Cottonwood Irrigation Company, United States Forest Service, Utah State Division of Oil, Gas & Mining [DOGM], and PacifiCorp held on August 1, 1991). Mr. Peacock indicated that production from the spring had been decreasing over the past several years and that he was unable to irrigate approximately twenty-two acres located on the north side of Highway 31 at the junction of Cottonwood Canyon Creek and Straight Canyon. Discussions during the on site visit centered around the location and extent of mining in the Deer Creek Mine, the drought which has had a major impact on the hydrologic resources of the area, and the hydrogeology of Cottonwood Spring.

As a result of the on site visit DOGM reviewed the available historical data on the flow and quality of Cottonwood Spring. In addition to historical review, DOGM requested that PacifiCorp update the Probable Hydrologic Consequences (PHC) in the Deer Creek Mine Permit Application Package (PAP). The Deer Creek PHC was updated and submitted on three separate occasions: December 19, 1991; March 23, 1992; and again on July 15, 1992. As part of the March 23, 1992 submittal PacifiCorp committed to drilling a series of wells and conducting a resistivity survey in Cottonwood Canyon Creek during the 1992 field season to determine the hydrologic significance of the alluvial deposits and the interrelationship of the surrounding strata. In addition to the work completed in 1992, PacifiCorp contracted Mayo & Associates during 1996 to complete a comprehensive hydrologic investigation of surface and groundwater systems in the East & Trail Mountain areas (refer to Appendix C in Volume 9 and Mayo & Associates Study in Volume 9: Hydrologic Support Information). During the investigation, Mayo & Associates analyzed 1) solute and isotopic compositions of surface waters and groundwaters, 2) surface water and groundwater discharge data, 3) piezometric data, and 4) geologic information. From the fall of 1998 through early 2001, Energy West Mining conducted gain/loss surveys of Cottonwood Canyon Creek to compare historical studies conducted by the USGS.

The United States Geological Survey (USGS) collected quality and quantity data at the Cottonwood Spring site from 1978 through 1982 (Open File Report 81-539 and 84-067). Monitoring of Cottonwood Spring was included in the Trail Mountain MRP in 1986 following a spring and seep survey conducted by JBR in 1985.

The following is a list of sources and the time frame in which data was collected:

USGS	1978-1982
JBR	1985
Trail Mountain Coal Co.	1986-1987
Mountain Coal Co.	1987-1992
Energy West Mining	1992-Present

As document in Volume 9, Cottonwood Canyon Creek is a major drainage system which borders the western limit of the East Mountain Permit area. Based on data collected by PacifiCorp, Cottonwood Canyon Creek is an ephemeral stream from its headwaters to Section 24, Township 17 South, Range 6 East and intermittent from that point to its confluence with Cottonwood Creek at Straight Canyon. During periods of drought flow in Cottonwood Canyon Creek is limited to flow emanating from the alluvial deposits at the intersection of Roans Canyon. From the intersection of Roans Canyon to Section 36 the stream loses water to the alluvial deposits. The drainage is dry from Section 36 to Section 6 except during spring runoff which occurs normally from late April through June or during precipitation events. Flow in the channel reemerges in Section 6 and continues to the confluence with Cottonwood Canyon at Straight Canyon.



It is evident in reviewing all of the data including; drilling results, resistivity surveys, well hydrographs and isotope information that the source of groundwater for Cottonwood Spring is the alluvial system of Cottonwood Canyon. Groundwater production from Cottonwood Spring area is function of precipitation and groundwater recharge. In reviewing the well hydrographs for wells CCCW1-3, groundwater levels in the alluvial wells have been increasing since mid 1995 in direct response to normal precipitation patterns (refer to Appendix F for hydrograph information). Groundwater trends in the Star Point Sandstone in wells CCCW-1 and CCCW-3 have been relatively constant or decreasing slightly. As stated previously, data collected during the development of the wells indicated that the alluvial system is not hydrologically connected to lower Blackhawk/Star Point formations. Monitoring data from the wells supports this conclusion.

Data collected during gain/loss surveys conducted from November 1998 through October 2000, compares directly to the measurements reported by the USGS in 1979 (Open File Report 81-539). Cottonwood Spring flow data reported by the USGS was not from a individual source, but was the difference in flow measurements above and below the spring area (refer to the 2000 Annual Hydrologic Report Appendix I for gain/loss survey results). Included in Appendix I is a hydrograph comparing the Palmer Drought Index (average of Regions 4 & 5) to Cottonwood Spring area flow. In reviewing the hydrograph, flow from the Cottonwood Spring area fluctuates in direct response to precipitation patterns and was not influence by mining in the Deer Creek Mine.

### 3. Quality

To more closely identify springs which are related one with another, water samples were analyzed to determine the percentage of cations and anions in solution. The percentages have been graphically represented as cation-anion diagrams. (See Appendix I.) The purpose of the cation-anion diagram is to identify groups of related springs by water chemistry. To better visualize the concept, the cation-anion diagrams are presented by the geologic formation in which the spring originates. A general pattern for the geologic formations can be recognized for each year in which the cations/anions were analyzed. A consistent pattern for the North Horn Formation is less obvious due to the complex geology of the formation itself. One aspect the cation-anion diagrams demonstrate, is that, even though the quality varies slightly from individual sites as well as from different formations, seasonal variations do not exist.

The quality of the springs sampled in 2001 reveals an excellent correlation with historical averages. A summary of the water quality analysis for springs monitored on Trail Mountain is presented in Table 38. In the table, the mean values for 2001 are compared to the historical results for each respective spring. Raw data is on file at the Energy West Main Office.

## V. MINE HYDROLOGY

### A. Groundwater and Surface Water Sources in Relation to Mine Workings

The relationship of the Deer Creek, Cottonwood/Wilberg, and Trail Mountain mine workings with the overlying springs is shown in Map HM-5 (in pocket). Beginning in 1979 (Trail Mountain - 1992), PacifiCorp has developed an ambitious spring monitoring program with emphasis to detect changes in the East and Trail Mountain hydrologic regime as a result of mining. The data collected to date reveal no indication of any mine-related effects on spring discharge or surface flow rates. As expected, there is a direct relationship between annual precipitation, temperature, and spring discharge rates as previously discussed in the SPRING SECTION and shown in Figure 3.

### B. Groundwater Quality and Collection Procedures

PacifiCorp began in-mine quality and quantity measurement in 1977 and has continued the measurement through 2001. With the collection of numerous samples throughout the extent of the mine workings, the quality has remained relatively constant. (Refer to Cation/Anion diagrams in Appendices J, K and L).

Collection procedures for groundwater quality consist of two grab samples collected and analyzed per quarter at each of the mines which produces measurable quantities of water. Sampling according to this established plan began in the first quarter of 1982. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality except when new sites are established. In that case, baseline information will be collected for two (2) years. (See Appendix N.)

Long-term monitoring locations have been established at each of the mines which produces measurable quantities of water, i.e., Deer Creek, Cottonwood/Wilberg, and Trail Mountain mines. (See Maps HM-2, HM-3, and Plate 7-3 in pocket.) Four types of occurrences have been recognized to exist within the current mine workings. (Refer to Figure 5.)

1. Structural rolls with overlying fluvial channels,
2. Fault systems (Pleasant Valley and Roans Canyon),
3. Fractures and joints (lineaments),
4. Roof bolt and in-mine drill holes.

A collection device was installed at each long-term monitoring location. Flow and temperatures collected on a quarterly basis from the long-term sites in both mines were fairly consistent. (See appendices J, K, and L for the Deer Creek, Cottonwood/Wilberg, and Trail Mountain In-Mine hydrographs.)

C. Mine Water

1. Deer Creek Mine

a. In-Mine Water Production

The best estimate of in-mine water production was arrived at by combining the following values:

Deer Creek Discharge	844.5 Million Gallons
Estimated Evaporation*	18.9 Million Gallons
Domestic Usage	<u>6.4 Million Gallons</u>
Total Discharge	869.8 Million Gallons

\*See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

Six samples were collected in the Deer Creek Mine in 2001. (See Map HM-2 in pocket for locations.) Parameters analyzed in 2001 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix N.)

Table 39 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 2001 to the historical values for each location. It is apparent from Table 39 that the average quality of the in-mine water has remained relatively constant. (Refer to Cation/Anion diagrams in Appendix J.) Raw data is on file at the Energy West Main Office.

c. Discharge Quantity

Excess water not utilized in the mining operation or for domestic use was either pumped to storage areas or discharged from the mine. The locations of the main sump areas within the mine are shown in Figure 6. The largest volume of water is stored in the western part of Main West, which has not been actively mined for several years.

In-line flow meters are utilized to record the amount of water discharged from the mine, after which it passes through underground sedimentation sumps. Discharge from Deer Creek is either shipped directly to Huntington Power Plant or to the Deer Creek drainage in accordance with stipulations of the Deer Creek UPDES Discharge Permit UT-0023604-002.

The total water discharged from the Deer Creek Mine during 2001 was estimated at 2,585 acre feet, or 844.5 million gallons. The recorded flow of 2,585 acre feet during 2001 is a fourteen

percent (14%) increase from the 2001 discharge of 2,272 acre feet. The average monthly discharges are shown in Figure 7.

A graph displaying the historical discharge rates is included as Figure 8. The volume of water discharged from the mine has increased at a significant rate from 1988 through 1991 due to at least five factors. First, in previous years water discharged was measured with a Stevens Recorder installed in a Parshall flume. It was difficult to maintain calibration of the recorder and, in 1985, in-line flow meters (totalizer and instantaneous flow) were installed, allowing for a more accurate measurement of discharge. Second, mining has progressed into areas largely dominated by sandstone roof. The inflow from those areas is greater per acre of exposed area than areas of mudstone top. Third, mining has progressed into the bottom of the Straight Canyon Syncline, the lowest part of the mine, where a significant amount of water has been intersected. Fourth, mining has intersected the Roans Canyon Fault Graben which has released additional water into the mine workings. Last, prior to 1985, water used in mining was pumped directly from the in-mine sumps. Since that time, all water has been pumped from the mine through the metering system. Mining water is then pumped back into the mine through a high-pressure steel line to the mining faces where it is utilized. Water production decreased significantly in 1992 with the sealing of the 4th South area.

d. Discharge Quality

Monthly water quality samples were collected for 2001. Table 40 compares the minimum, maximum, and mean values from an historical standpoint to 2001. An examination of Table 40 reveals excellent correlation with historical results. Raw data is on file at the Energy West Main Office.

2. Des-Bee-Dove Mine

Production at the Des-Bee-Dove Mine was terminated indefinitely as of February 14, 1987. The portals were sealed and underground hydrologic monitoring was discontinued.

3. Wilberg/Cottonwood Mine

The mine fire which occurred in late 1984 altered normal hydrologic monitoring at the Wilberg Mine. Normal hydrologic monitoring was reinstated in late 1985 and continued through May 2001. Energy West Mining Company notified the Division of temporary cessation of coal mining operations at the Cottonwood/Wilberg Mine effective May 29, 2001. Coal mining at the Trail Mountain Mine/coal transfer to Cottonwood Tipple ceased as of March 15, 2001. In preparation of temporary cessation, all associated mining equipment including; belt haulage (drives and headrollers), dewatering (pumps and control boxes) and electrical (transformers/rectifiers) were removed from the mine. Verification of equipment removal was conducted on May 4, 2001 Division of Oil, Gas and Mining (Pete Hess) participating in the review. Bureau of Land Management was notified but was unable to

attend. A plan to construct permanent seals was submitted to and approved by Mine Safety Health Administration. Sealing of the mine portals was completed on May 28, 2001.

a. In-Mine Water Production

In previous reports, the in-mine water production was arrived at by combining mine discharge, domestic use, and evaporation. Due to the fire, normal coal production and usage were not experienced. Pre-fire coal production resumed during late 1985. A large part of the mine workings have been sealed since the fire. The locations of the sealed areas and sumps are shown on Figure 9. As reported in the 1984 Annual Report, water discharged from the Wilberg Mine complex includes the area designated as the Cottonwood Mine. (See Figure 10.) Consistent with previous years, the following table lists the factors involved in estimating in-mine water production.

Wilberg/Cottonwood Discharge

Grimes Wash*	15.2 Million Gallons
Miller Canyon**	0.0 Million Gallons
Estimated Evaporation***	7.9 Million Gallons
Domestic Usage	<u>1.9 Million Gallons</u>

Total Discharge                      25.0 Million Gallons

\* Discharge Outfall 001 re-located from Grimes Wash to Cottonwood Canyon Creek TMA Portal - July 2001

\*\* Sealed ventilation breakout which intermittently discharges.

\*\*\* See 1981 Hydrologic Monitoring Report.

b. In-Mine Quality

Two samples were collected in the Wilberg/Cottonwood Mine in 2001 prior to temporary cessation. (See Map HM-3 in pocket for locations.) Parameters analyzed in 2001 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix N.) Table 41 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 2001 to the historical values. The average quality by location has remained relatively constant for each individual location. (Refer to Cation/Anion diagrams in Appendix K.) Raw data is on file at the Energy West Main Office.

c. Discharge Quantity

Prior to temporary cessation, water produced in the Wilberg Mine gravity flows to the northern area of 1st North. At that point it can either be pumped by a vertical turbine located in the Deer Creek

Mine which picks up the water and pumps it back to the south and down to the Wilberg Mine main sump or pumped directly to the main sump utilizing submersible pumps. Water produced in the Cottonwood Mine (2nd North area) is transferred to the Wilberg Mine sump. The sump, which functioned as a settling basin, effectively removes settleable solids from the water. A portion of the water was redistributed to various areas of the mine to be utilized in the mining operations. A total of 8.9 million gallons was discharged to Grimes Wash during 2001. A total of 6.3 million gallons was discharged to Cottonwood Canyon Creek (TMA portal) during 2001. No discharge occurred in 2001 at the Miller Canyon breakouts, which were developed for ventilation purposes but sealed in 1987. (See Figure 11.) The portal breakouts at Miller Canyon were reclaimed in 1999. Minor seeps occur through a french drain system installed at each portal, but groundwater production is insufficient for measurement. Discharge from Cottonwood Mine is monitored in accordance with stipulations of the Wilberg Mine Discharge UPDES Permit UT-0022896.

d. Discharge Quality

Samples are collected each month from Grimes Wash and Miller Canyon breakouts whenever discharge occurs. Monthly samples were collected from either the Grimes Wash or TMA locations during 2001, except from May through July when no discharge occurred. Table 42 compares the minimum, maximum, and mean values from 2001 to the historical values.

4. Trail Mountain Mine

Energy West Mining Company notified the Division of temporary cessation of coal mining operations at the Trail Mountain Mine effective May 4, 2001. Coal mining at the Trail Mountain Mine ceased as of March 15, 2001. In preparation of temporary cessation, all mining equipment including; production (longwall and continuous miner), belt haulage and electrical were removed from the mine. Verification of equipment removal was conducted on April 6, 2001 with Bureau of Land Management (Steve Falk) and Division of Oil, Gas and Mining (Pete Hess) participating in the review. A plan to construct permanent seals was submitted to and approved by Mine Safety Health Administration. Sealing of the mine portals was completed on May 2, 2001.

a. In-Mine Water Production

The best estimate of in-mine water production was arrived at by combining the following values:

Trail Mountain Discharge	14.4 Million Gallons
Estimated Evaporation*	6.3 Million Gallons
Domestic Usage	<u>1.1 Million Gallons</u>
Total Discharge	21.8 Million Gallons

\* See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

One sample was collected in the Trail Mountain Mine in 2001 prior to temporary cessation. (See Plate 7-3 for locations.) Site UG-2 was terminated in 1995 due to insufficient flow. Parameters analyzed in 2001 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix N.) Table 43 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 2001 to the historical values for each location. It is apparent from Table 43 that the average quality of the in-mine water has remained relatively constant. (Refer to Cation/Anion diagrams in Appendix L.)

c. Discharge Quantity

Prior to cessation, water produced in the Trail Mountain Mine either is pumped or gravity flows to a sump located in 4th Left, 5th Left, and 3rd South. (See Figure 12.) A portion of the water is redistributed to various areas of the mine to be utilized in the mining operations. Excess water not used in the mining operations is stored in sealed areas of the mine or discharged to Cottonwood Canyon Creek. A total of 14.4 million gallons was discharged to Cottonwood Canyon Creek during 2001. (See Figure 13.) Discharge from Trail Mountain is monitored in accordance with stipulations of the Trail Mountain Mine UPDES Discharge Permit UTG040003-002.

d. Discharge Quality

Monthly water quality samples were collected from January through April 2001. Discharge from the Trail Mountain Mine was initiated in June of 1997. Table 44 compares the minimum, maximum, and mean values from an historical standpoint to 2001. Raw data is on file at the Energy West Main Office.

## VI. PIEZOMETRIC GRADIENT INFORMATION

### A. Surface

#### 1. Cottonwood Canyon Creek

Eight (8) wells located along the extent of Cottonwood Canyon Creek are monitored monthly. The following table lists the zone isolated with each well.

<u>Well I.D.</u>	<u>Monitoring Zone</u>
CCCW-1A	Alluvial Deposits
CCCW-1S	Starpoint Sandstone
CCCW-2A	Alluvial Deposits
CCCW-3A	Alluvial Deposits
CCCW-3S U	Blackhawk - Fluvial Sandstone
CCCW-3S L	Starpoint Sandstone
EM-31	Lower Blackhawk/Starpoint Sandstone
TM-1B	Starpoint Sandstone
TM-3	Starpoint Sandstone (Straight Canyon)

#### 2. Rilda Canyon

Six (6) wells located in Rilda Canyon are monitored monthly when accessible. The following table lists the zone isolated with each well.

<u>Well I.D.</u>	<u>Monitoring Zone</u>
P-1	Alluvial Deposits
P-4	Alluvial Deposits
P-5	Alluvial Deposits
P-6	Alluvial Deposits
P-7	Alluvial Deposits
EM-47	Lower Blackhawk/Starpoint Sandstone

Information collected during 2001 correlated well with historical information. As a result of mining in the western portion of the Trail Mountain Mine Well TM-3 in Straight Canyon decreased in level due to depressurization of the Star Point sandstone. Hydrographs for the individual wells can be found in Appendix E - Rilda Canyon, Appendix F - Cottonwood Canyon.



B. In-Mine

1. Deer Creek

Four (4) long-term monitoring wells were completed during 1989. (See Map HM-2 for well locations.) Due to changes in the mine layout only one well remained active during 2001. Water levels remained constant during 2001. (See Appendix J.)

2. Cottonwood Mine

During 1989 four holes were drilled in the Cottonwood Mine. Monitoring of the long-term wells, WCP 1-3, was discontinued in 1992 due to the sealing of the 3rd South area.

## VII. WASTE ROCK WELLS

### A. Deer Creek Mine - Waste Rock Storage Facility

The Deer Creek Waste Rock Storage Facility is located on the northeast side of State Highway 31 approximately six (6) miles west of Huntington, Utah.

The geology of the Deer Creek Waste Rock Storage Facility is fairly simple and straightforward. The site is located on the southern flanks of Gentry Mountain in the area just south of Wild Horse Ridge. Rocks exposed in the area are marine-derived mudstones in the lower portion of the Masuk member of the Mancos Shale. The Masuk Shale on the bench which adjoins the proposed site on the east and west is covered by a five- to twenty-foot thick layer of terrace gravel of Quaternary age. North-south trending normal faults have disrupted the strata in the region; however, no faults are known to exist within the area of the Deer Creek Waste Rock Storage Facility.

The test wells completed prior to construction identified the existence of a limited quantity of groundwater locally in the Masuk Shale. The water is most likely flowing along fractures in the strata. The rate of water migration has been shown to be extremely slow (<100 feet per year); therefore, the operations to be conducted at the waste rock site should not impact the hydrology of the area. The weathered Masuk Shale present on and near the ground surface will act as an effective barrier to prevent the surface waters from migrating to depths and intersecting groundwater.

The groundwater present in the terrace gravels should not be impacted by the waste rock site because it is located at a higher elevation than the proposed site.

In order to identify the groundwater quality characteristics of the waste rock storage facility one of the test wells completed prior to the construction of the site was developed into a long-term water monitoring well. (See Map HM-1 for location.)

Four samples were collected in 2001. The analysis, along with water depth, is listed in Table 45. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office. It is a well known fact that the Mancos Shale typically contains large quantities of soluble minerals such as gypsum; therefore, any water passing through it will be naturally high in dissolved solids. Samples at the waste rock well verify this condition.

B. Cottonwood/Wilberg Mines - Waste Rock Storage Facility

The Cottonwood/Wilberg Waste Rock Storage Facility is located on the west side of the Wilberg Mine road approximately 1.5 miles south of the Wilberg Mine.

The geology of the proposed waste rock site is fairly simple and straightforward. The site is located on the southern flank of East Mountain to the south of Newberry Canyon. Rocks exposed in the area are marine-derived mudstones in the lower portion of the Masuk member of the Mancos Shale. The Masuk Shale on the bench which adjoins the proposed site on the north and east is covered by a five- to twenty-foot thick layer of terrace gravel of Quaternary age. North-south trending normal faults have disrupted the strata in the region; however, no faults are known to exist within the area of the waste rock site.

In order to identify the groundwater quality characteristics of the waste rock storage facility one of the test wells completed prior to the construction of the site was developed into a long-term water monitoring well. (See Map HM-1 for location.)

Four samples were collected in 2001. The analysis, along with water depth, is listed in Table 45. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office. It is a well known fact that the Mancos Shale typically contains large quantities of soluble minerals such as gypsum; therefore, any water passing through it will be naturally high in dissolved solids. Samples at the waste rock well verify this condition.

## VIII. EFFECTS OF MINING AND SUBSIDENCE ON HYDROLOGY

Since the development of the PacifiCorp mining complex on East and Trail mountains, coal has been extracted causing the partial collapse of the immediate overburden strata and, ultimately, surface subsidence. This occurs in areas of retreat mining in room and pillar sections and in areas of longwall mining. All areas with potential for subsidence are monitored annually. (See annual Subsidence Monitoring reports.)

The springs and surface waters above all areas of mine workings are being monitored closely to measure the effects of mining. No mining-related changes to the springs or surface waters have been identified in the data collected. The water flowing into the mine workings, although temporarily diverted or detained, has not had an impact on the surface waters of East and Trail mountains or the surrounding area.

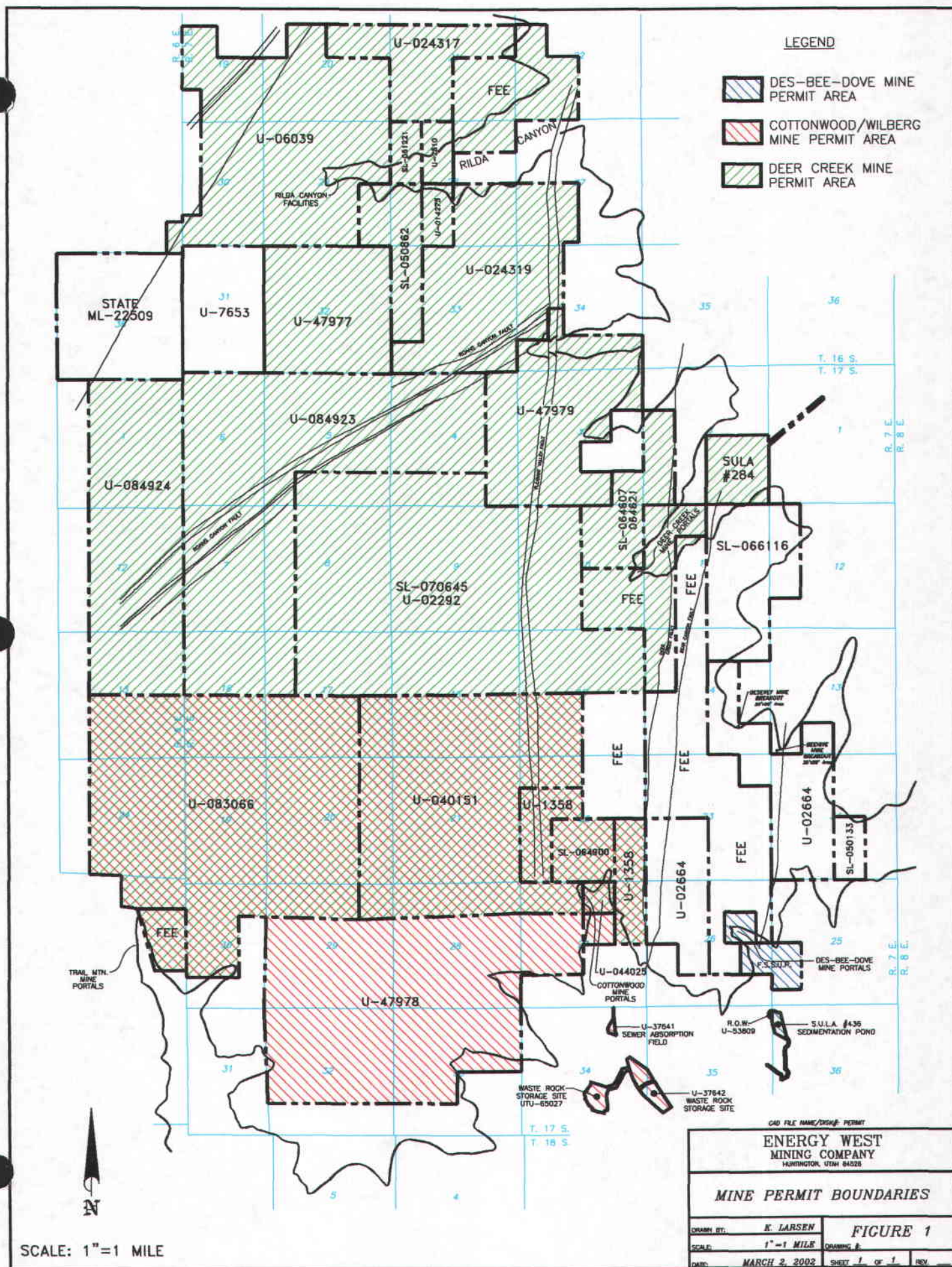
## IX. SUMMARY

PacifiCorp has been conducting a water monitoring program in the area of its underground coal mines in Emery County, Utah in accordance with federal and state regulations. The program has been in existence since 1977, and this is the twenty-fourth annual report submitted concerning the hydrology.

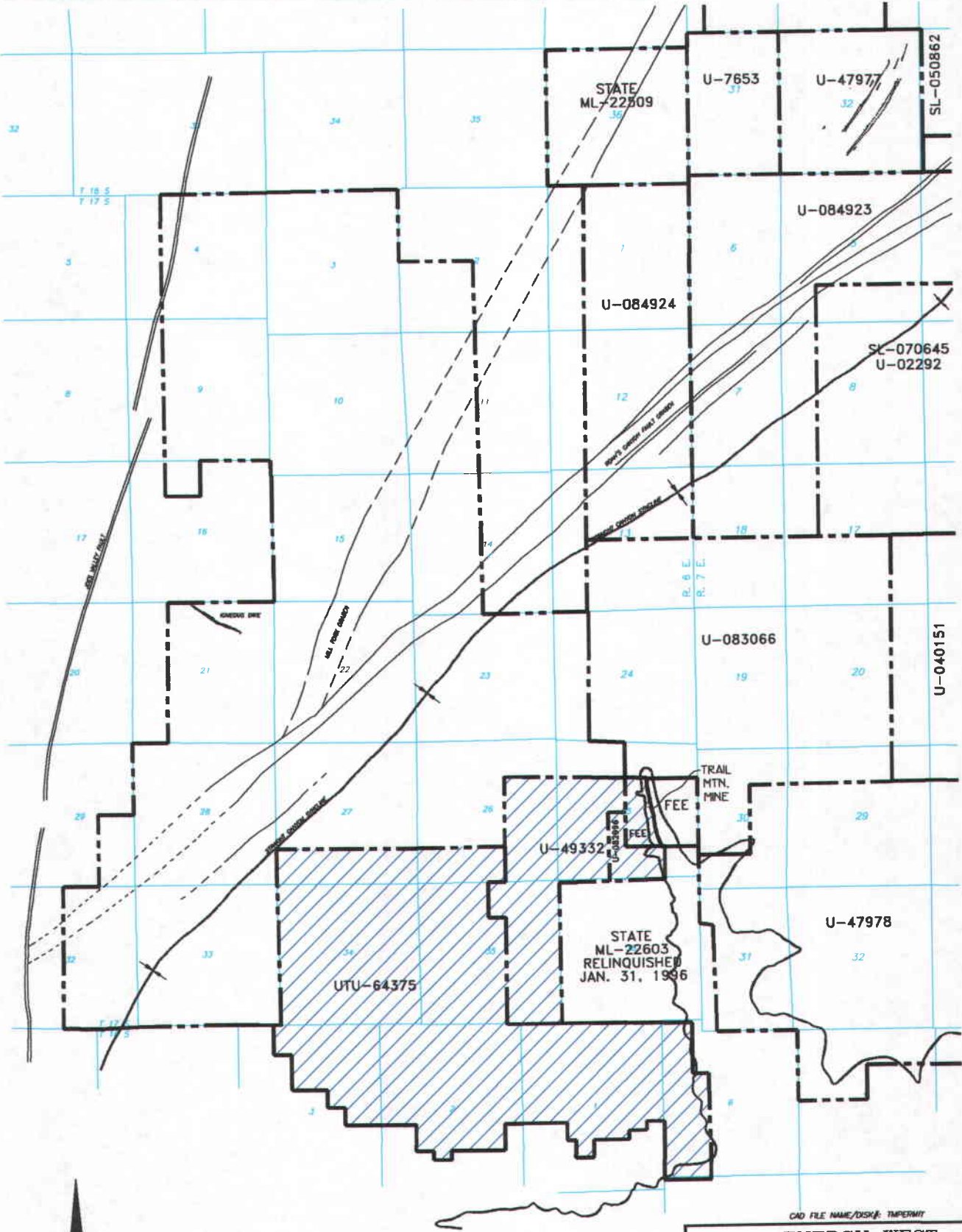
From 1982 to 1984 the Western United States, especially Utah, experienced an unprecedented wet cycle of precipitation. The pattern changed in 1985 with conditions returning to slightly above normal. During the 1986 water year the extremely wet trend returned, and the upper Colorado River Basin experienced above average precipitation. The 1987 weather pattern changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal. The drought continued from 1988 through 1992 and returned in 1994. Runoff improved substantially in 1993 and 1995 through 1998 with above average flow conditions occurring in most drainages. In 1999 runoff was higher than normal although not as high as 1998. In 2000, weather conditions changed dramatically and the resulting runoff and groundwater production was much lower than normal. Precipitation was higher in 2001 but the runoff values remained much below normal.

The data collected in 2001 continued to show the relationship between the variation in surface water quantity and precipitation, but the hydrologic monitoring completed on East and Trail mountains to date has failed to identify any change in the quantity or quality of ground or surface water which can be attributed to mining on the East and Trail Mountain properties.









SCALE: 1"=1 MILE



TRAIL MOUNTAIN MINE  
PERMIT AREA

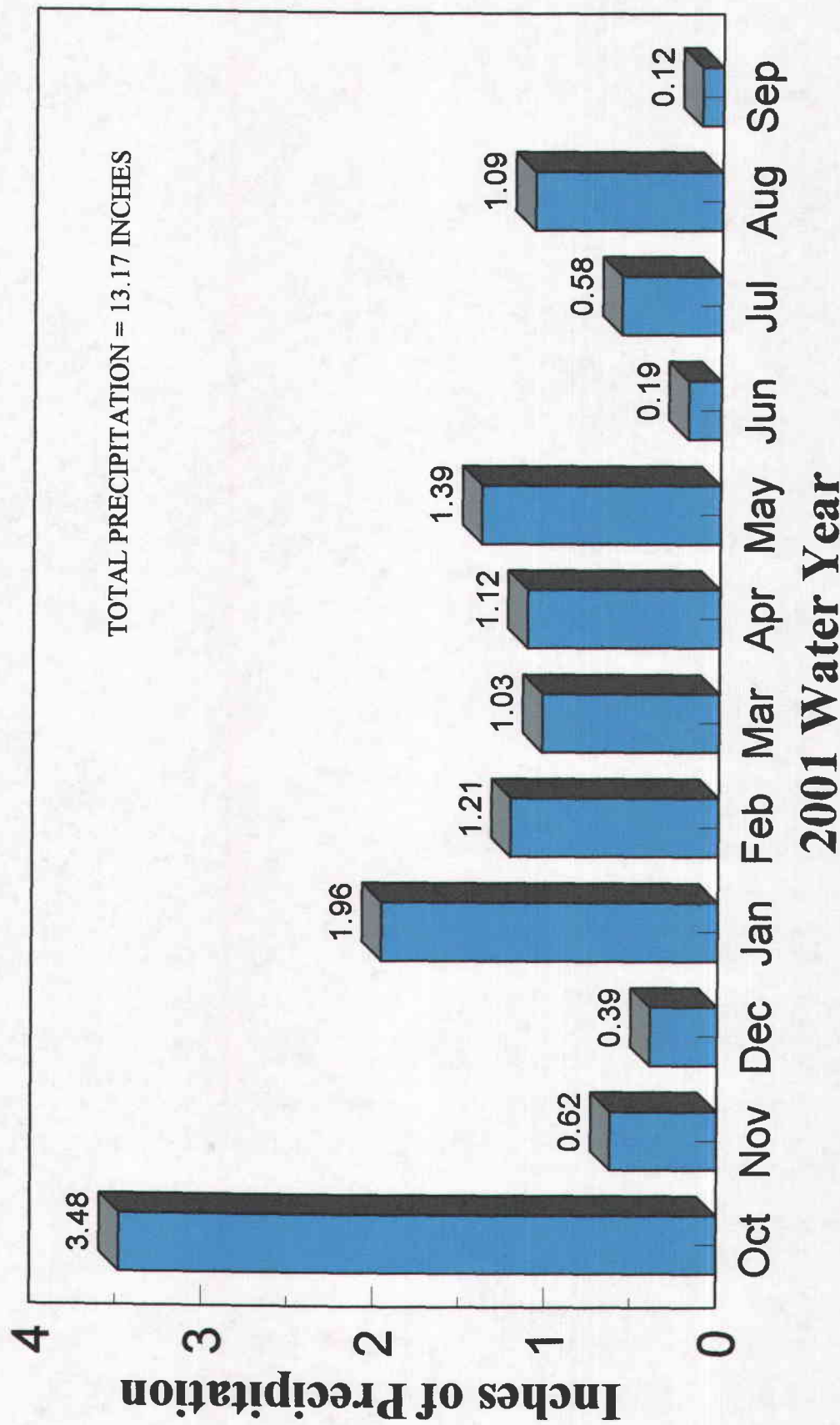
CAD FILE NAME/DISK: TMPERMIT

ENERGY WEST  
MINING COMPANY  
HUNTINGTON, UTAH 84320

TRAIL MOUNTAIN MINE  
MINE PERMIT BOUNDARY

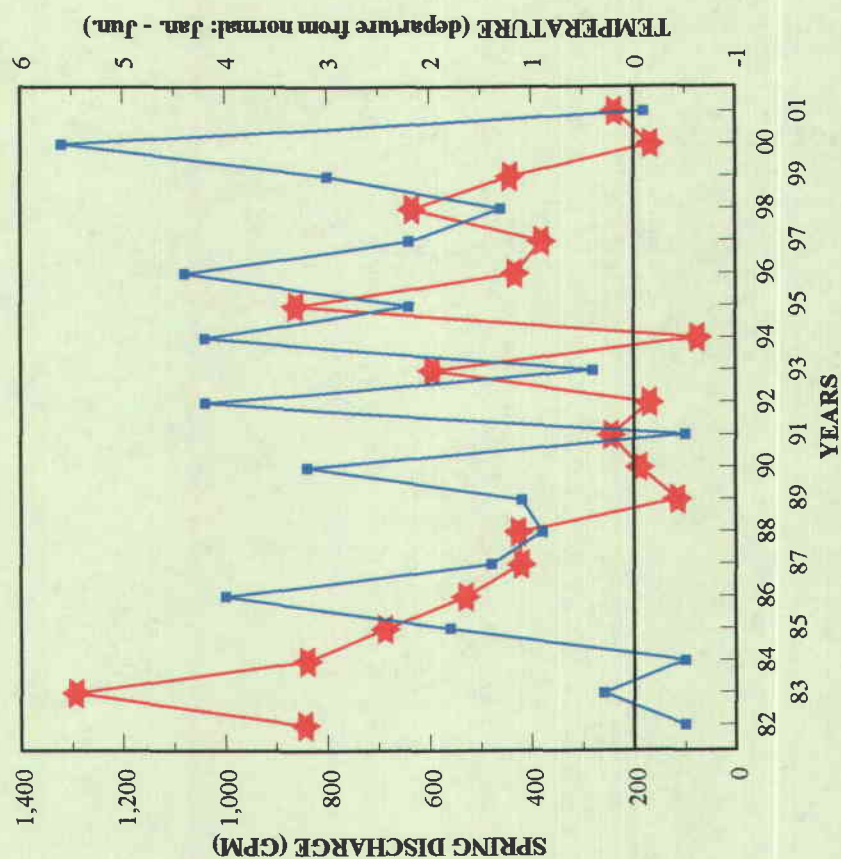
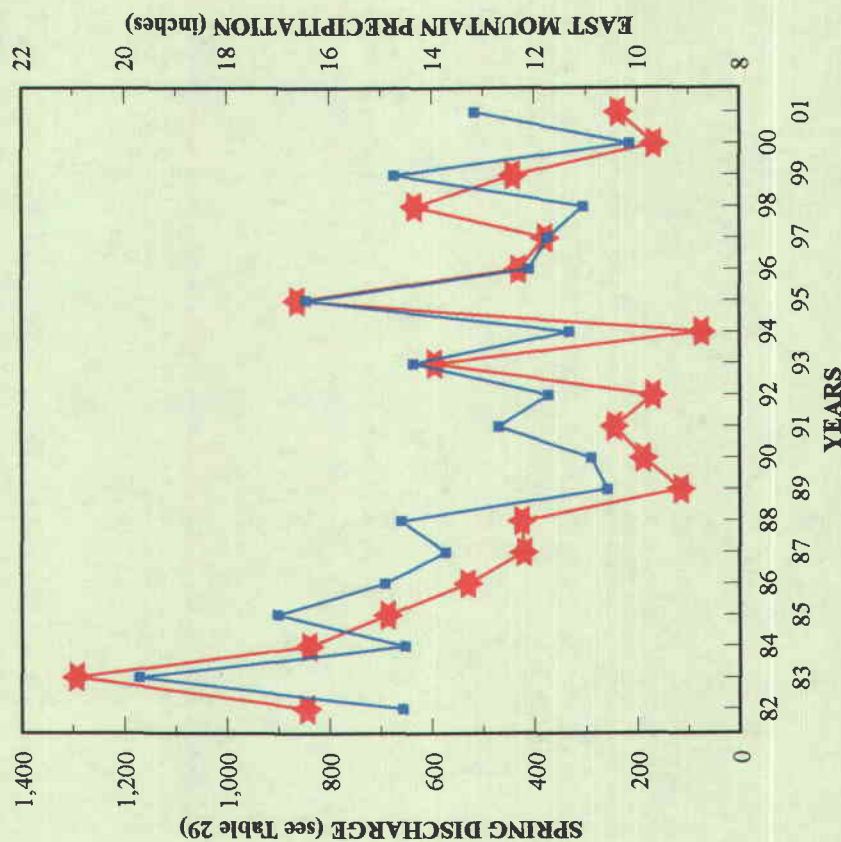
DRAWN BY:	K. LARSEN	FIGURE 1B
SCALE:	1"=1 MILE	DRAWING #:
DATE:	MARCH 2, 2002	SHEET 1 OF 1
		REV.

**FIGURE 2**  
**EAST MOUNTAIN PRECIPITATION**  
**2001 WATER YEAR**

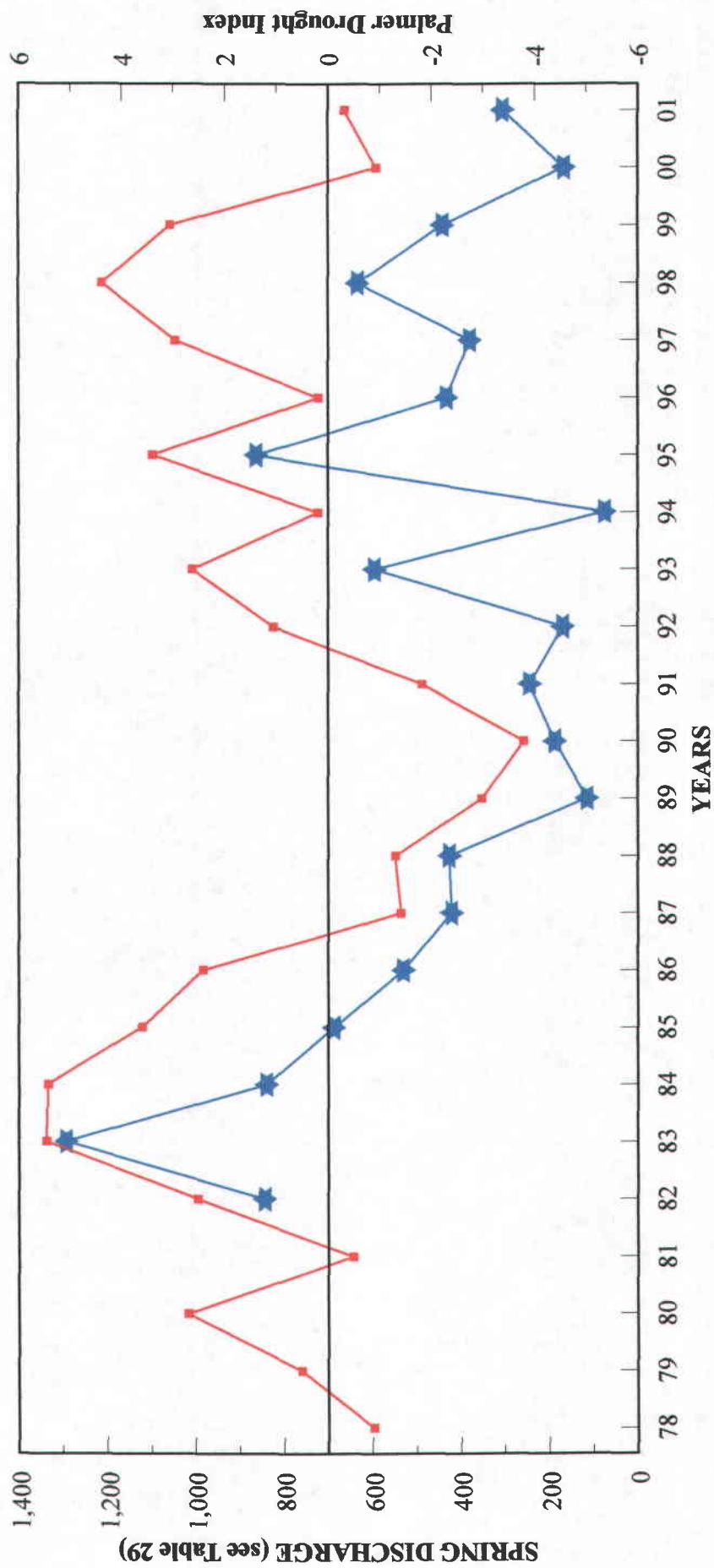




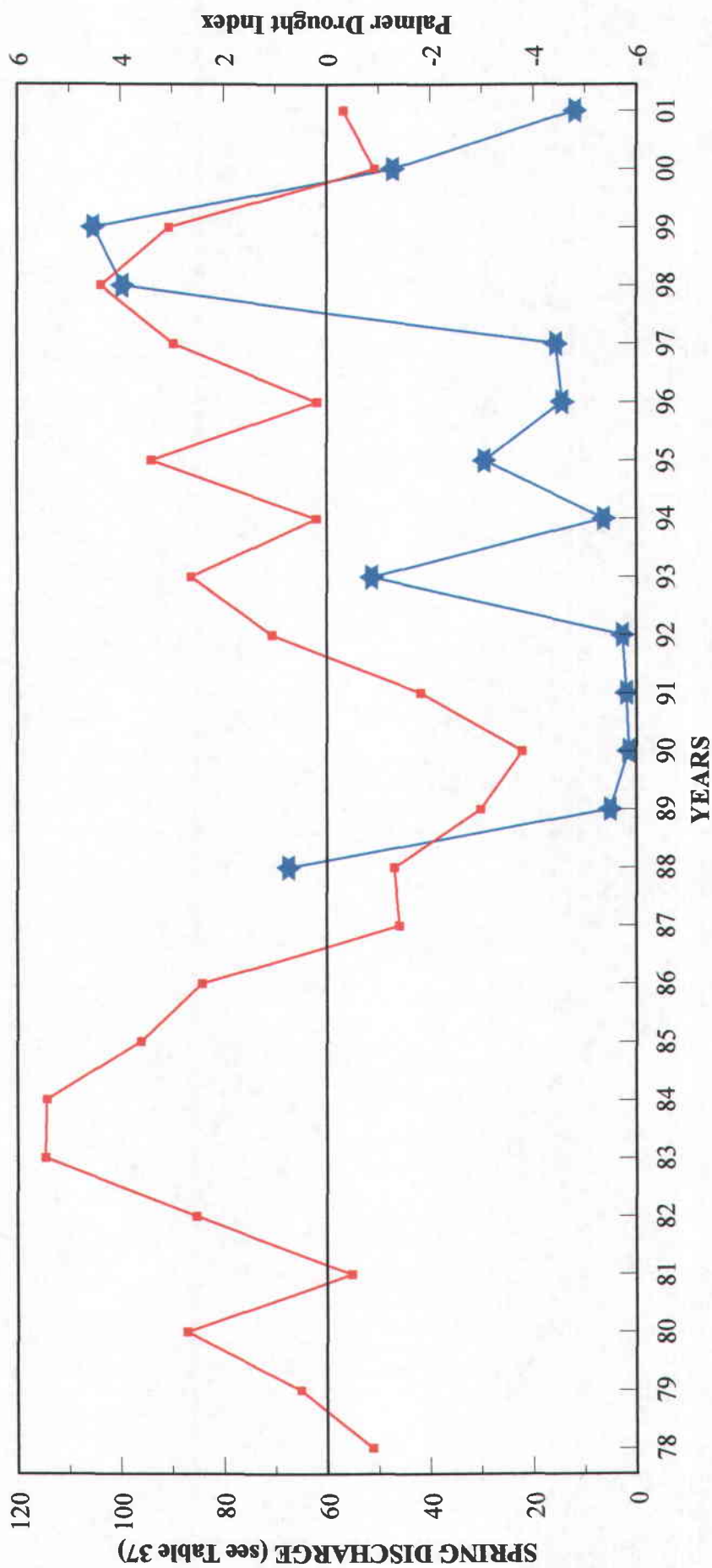
**FIGURE 3a**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE vs. PRECIPITATION & TEMPERATURE**



**FIGURE 3b**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE vs. PALMER DROUGHT INDEX**  
 (Palmer Data - Average of Region 4 & 5)

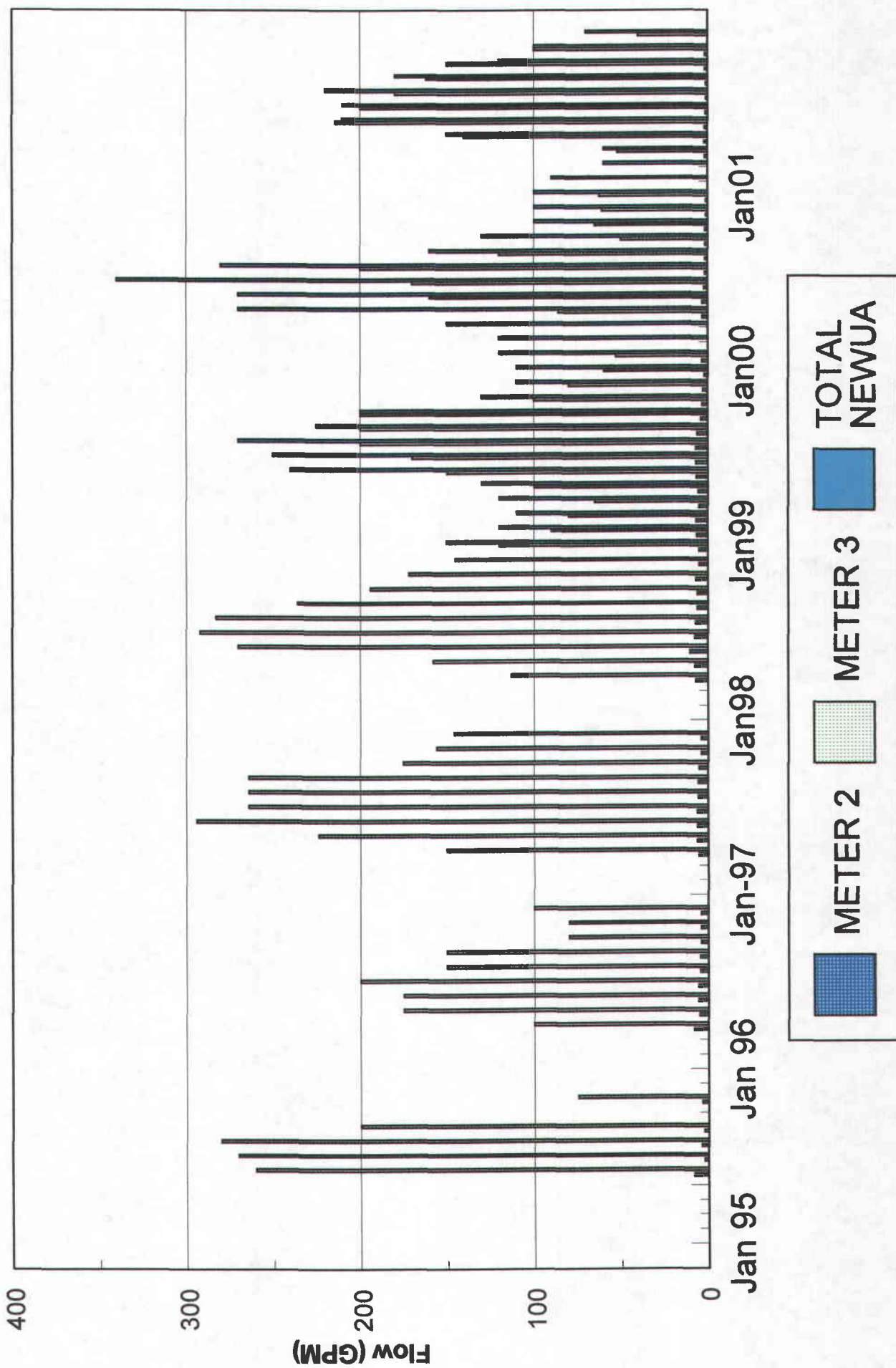


**FIGURE 3c**  
**TRAIL MOUNTAIN**  
**SPRING DISCHARGE vs. PALMER DROUGHT INDEX**  
**(Palmer Data - Average of Region 4 & 5)**

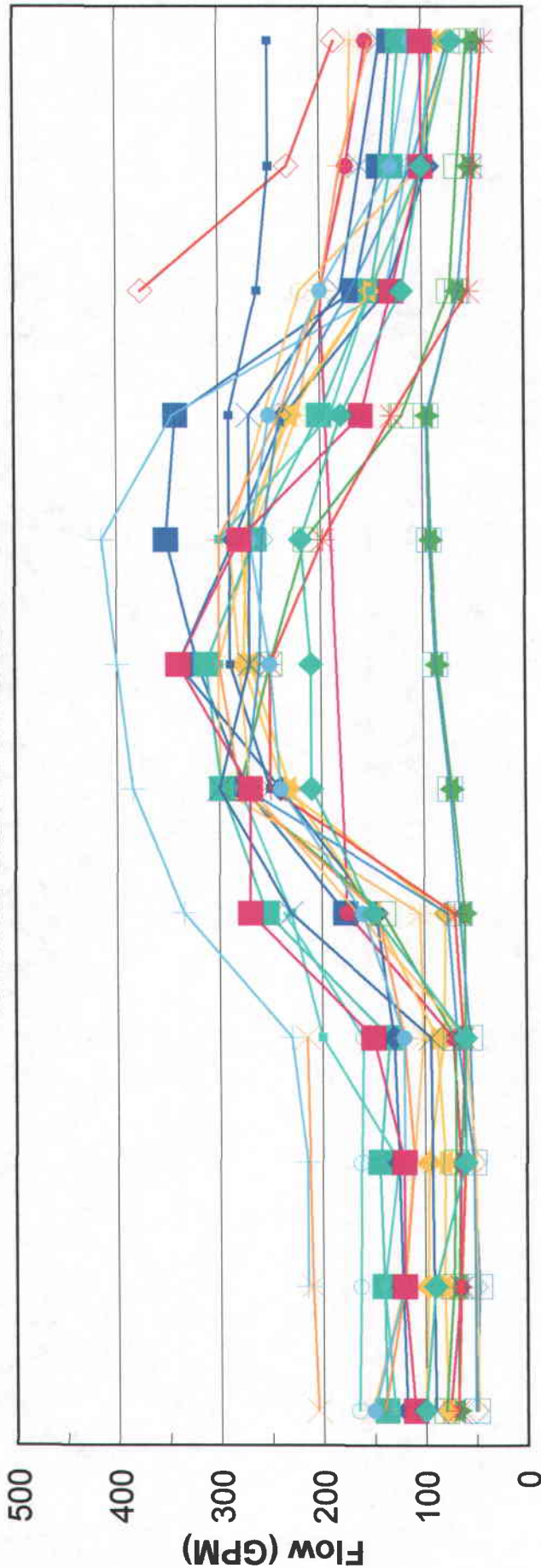




**FIGURE 4 (a)**  
**NORTH EMERY WATER USERS ASSOCIATION**  
**RILDA CANYON SPRINGS**



**FIGURE 4 (b)**  
**NORTH EMERY WATER USERS ASSOCIATION**  
**RILDA CANYON SPRINGS**

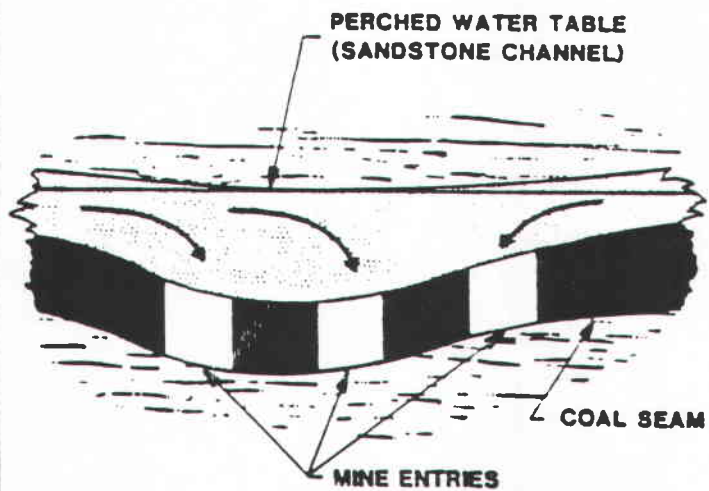


Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1975	100	97	96	81	177	275	321	352	342	166	141	130
1976	68	67	65	60	79	237	276	272	233	151	99	75
1977	50	47	52	56	65	74	86	92	95	65	53	49
1978	152	121	111	101	104	299	301	269	222	376	232	185
1980	165	163	162	160	237	250	289	269	290	201	172	169
1981	205	210	215	215	335	385	400	415	345	262	250	250
1982	76	65	65	72	175	298	313	285	201	135	114	94
1983	138	140	144	134	254	240	340	285	235	200	174	154
1984	118	122	125	130	147	231	269	278	229	151	130	122
1985	78	81	80	88	148	280	250	215	120	73	98	88
1986	80	72	70	70	140	275	260	258	240	170	85	55
1987	51	51	52	68	77	250	250	198	130	55	110	73
1988	68	65	60	62	70	250	250	188	130	55	50	40
1989	48	140	50	60	70	270	280	290	190	220	100	100
1990	130	140	125	200	230	280	300	300	190	150	100	90
1991	90	120	110	94	230	300	270	270	270	180	160	140
1992	140	120	120	120	145	280	300	300	240	200	180	150
1993	150	120	120	120	160	270	250	270	250	200	130	110
1994	110	120	120	160	270	270	340	280	180	130	100	100
1995	100	80	80	80	150	210	210	220	180	120	100	70

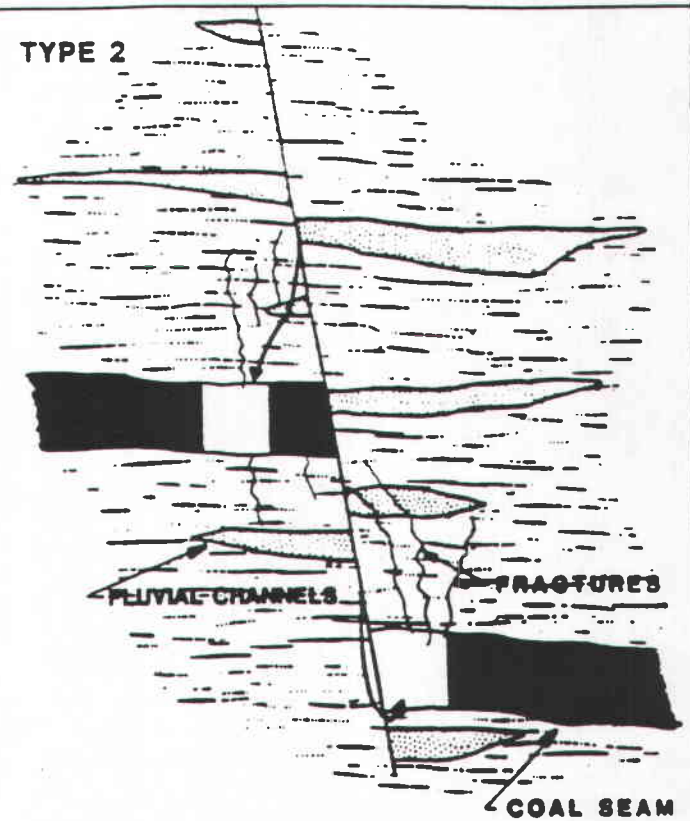


**FIGURE 5**  
**LONG TERM WATER SOURCES**

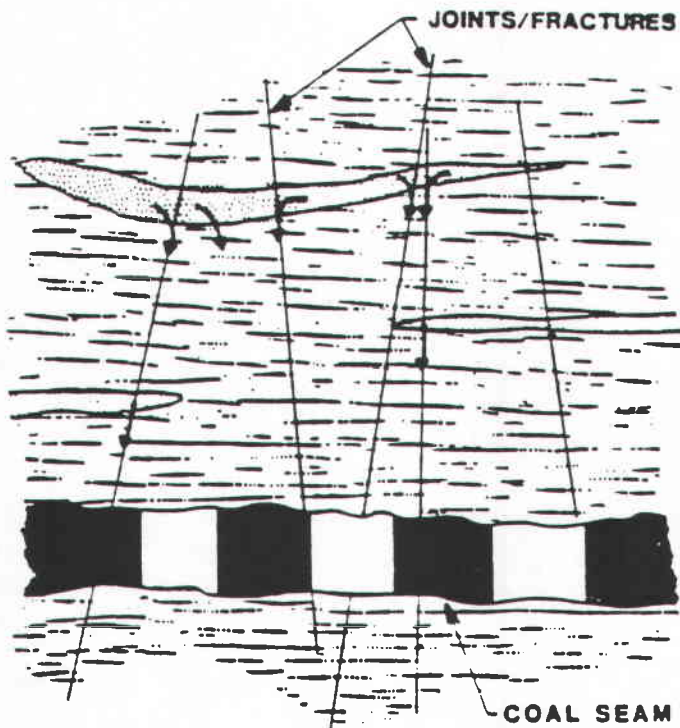
**TYPE 1**



**TYPE 2**



**TYPE 3**



**TYPE 4**

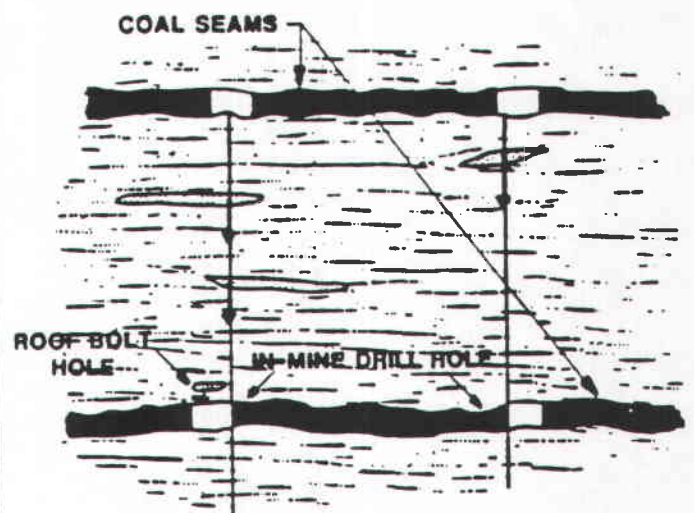
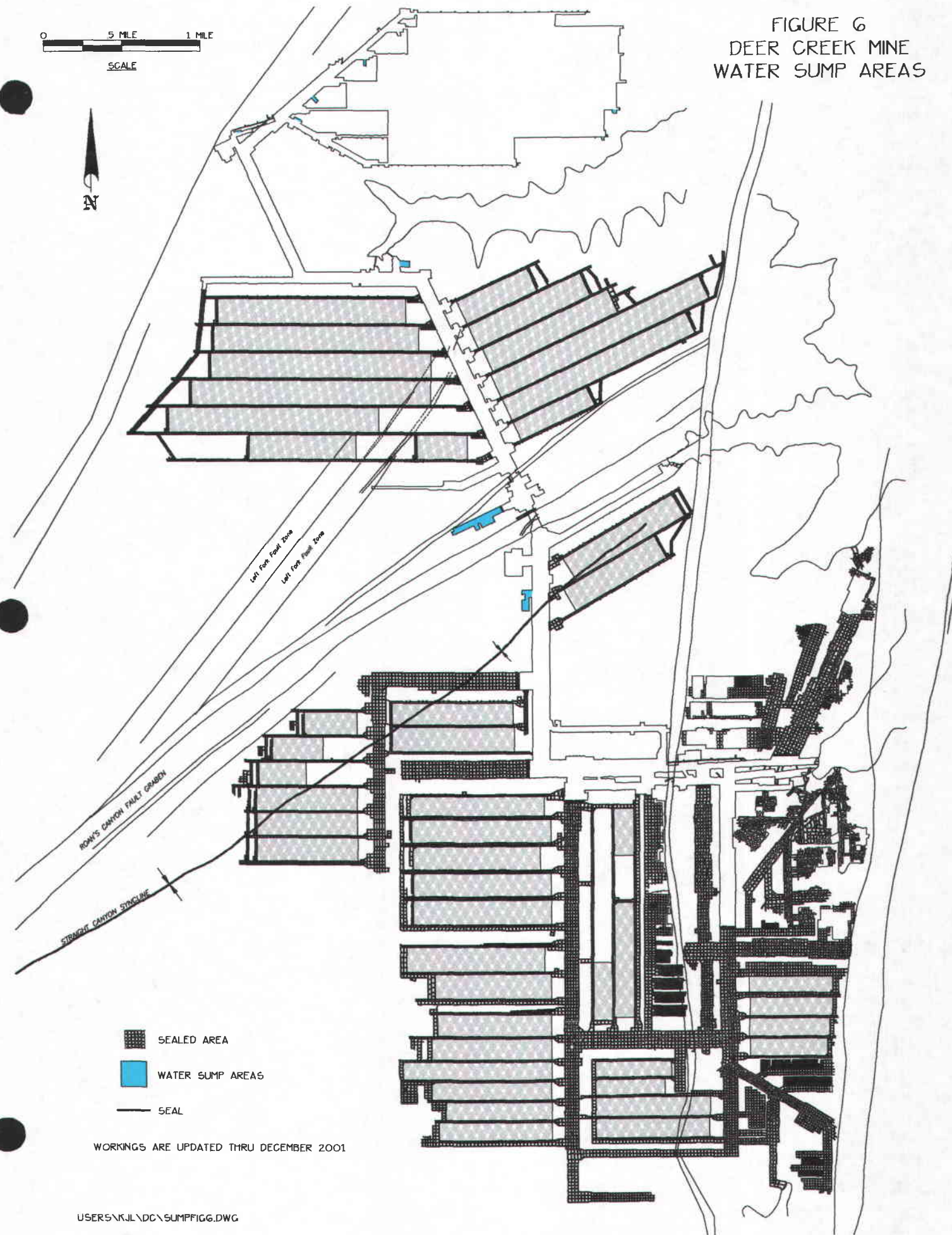


FIGURE 6  
DEER CREEK MINE  
WATER SUMP AREAS





**FIGURE 7**  
**DEER CREEK MINE**  
**2001 MINE WATER DISCHARGE**





**FIGURE 8**  
**DEER CREEK MINE DISCHARGE**  
**@ Deer Creek (UPDES UT-0023604)**  
**January 1980 through December 2001**

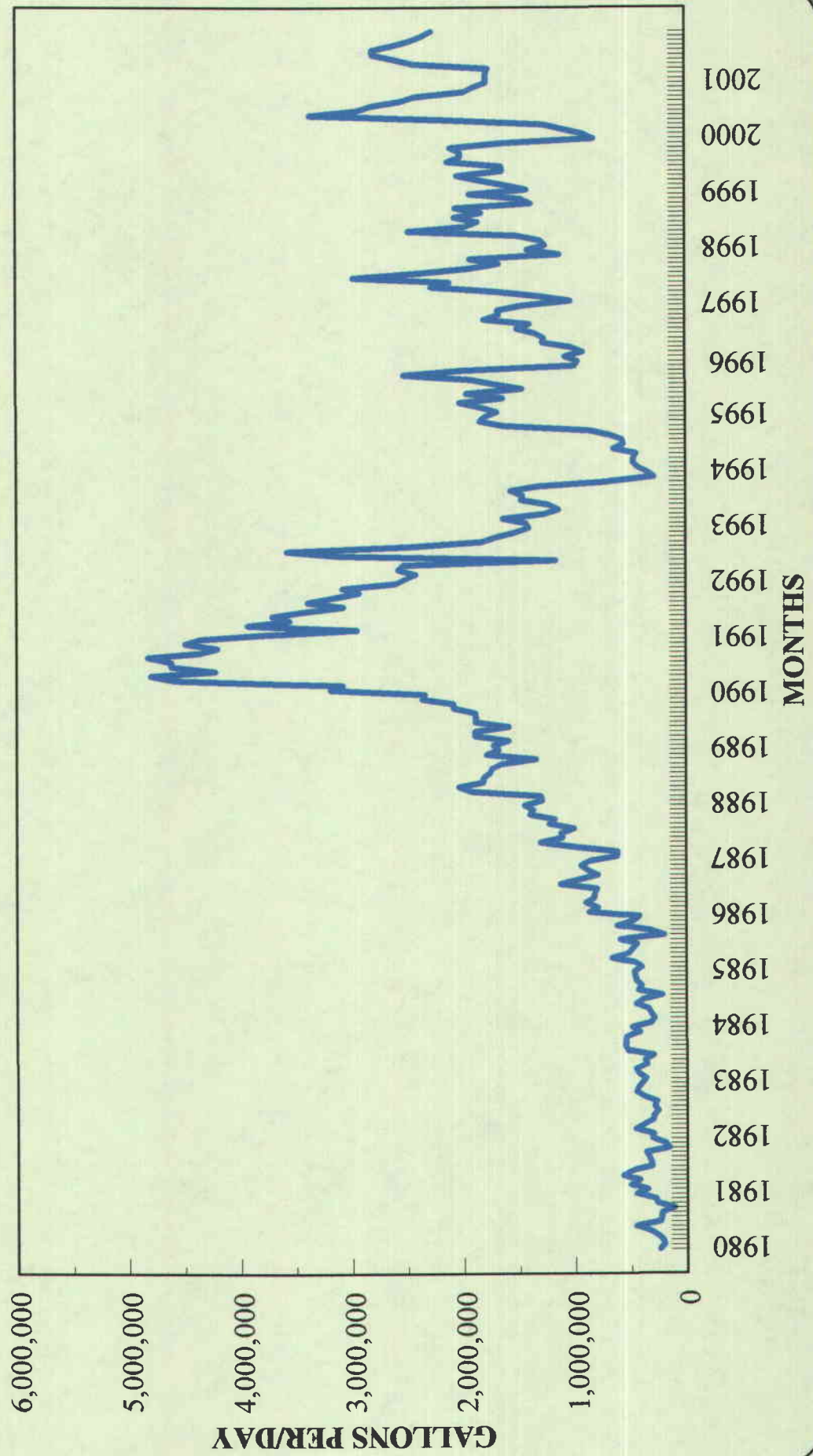
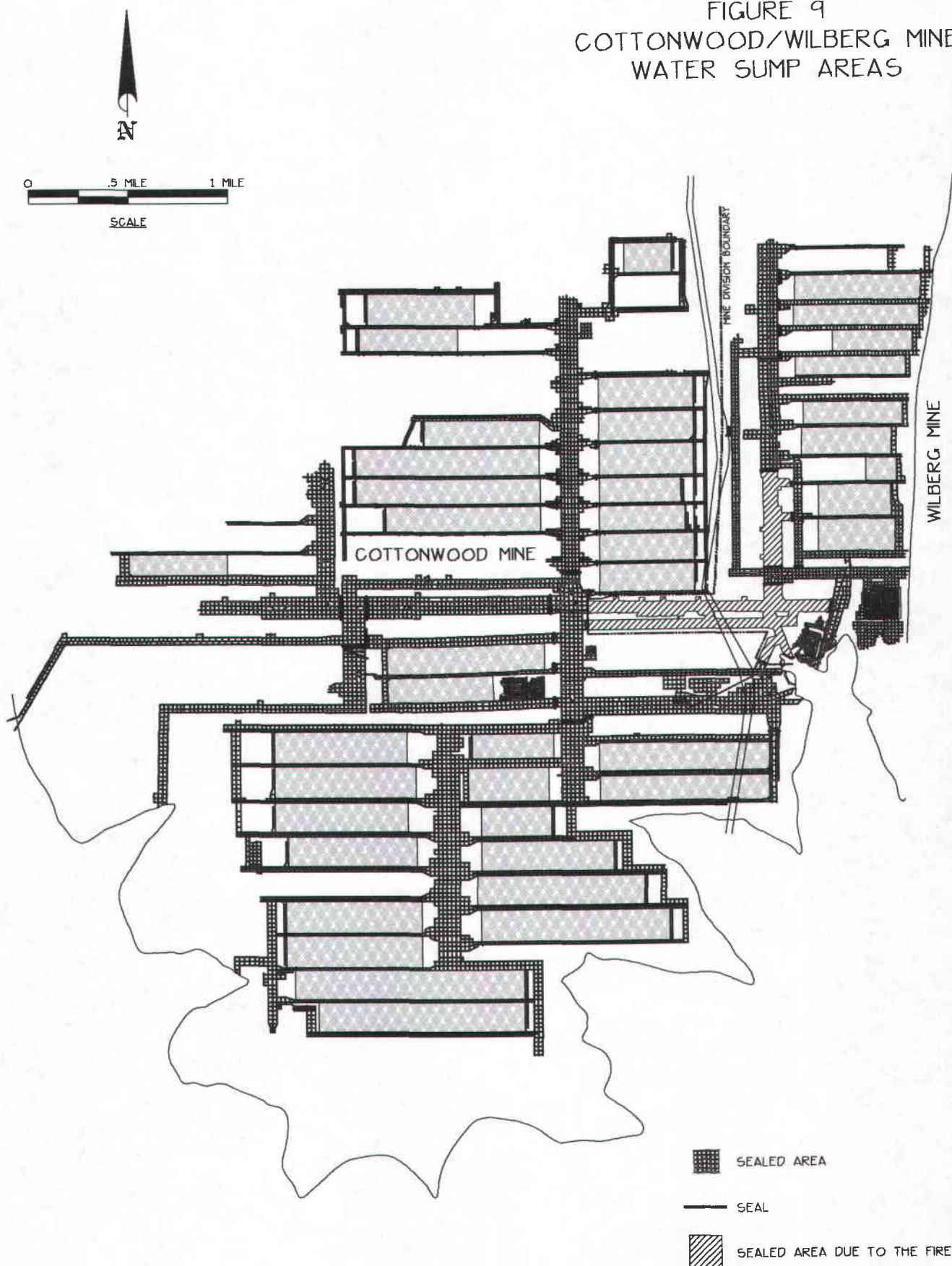


FIGURE 9  
COTTONWOOD/WILBERG MINE  
WATER SUMP AREAS



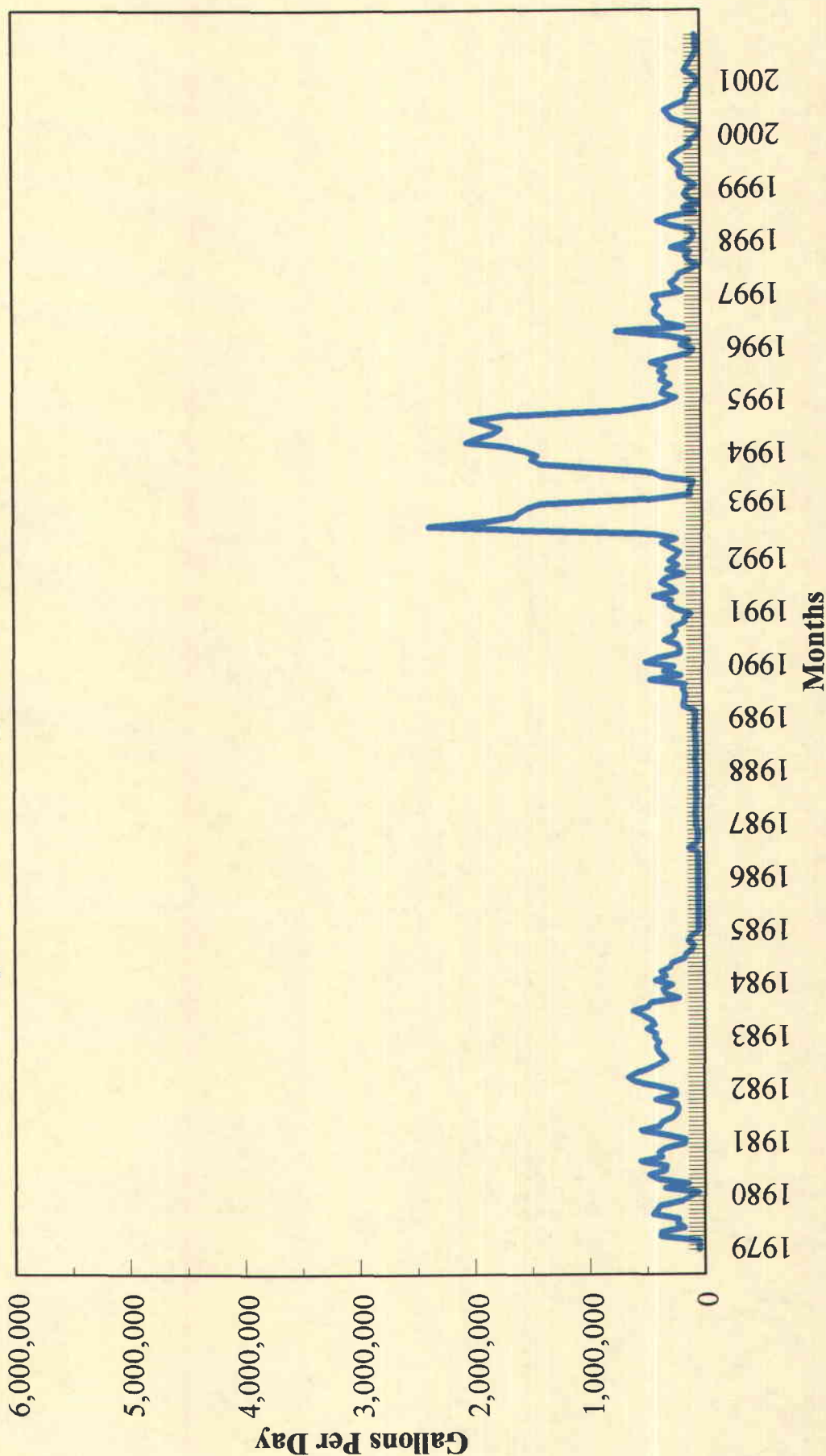
MINE SEALED MAY 2001  
WORKINGS ARE UPDATED TO MARCH 1, 1997

# FIGURE 10

## WILBERG/COTTONWOOD MINE DISCHARGE

@ Grimes Wash (UPDES UT-0022986)

April 1979 through December 2001





# FIGURE 11

## WILBERG/COTTONWOOD 2001 MINE WATER DISCHARGE

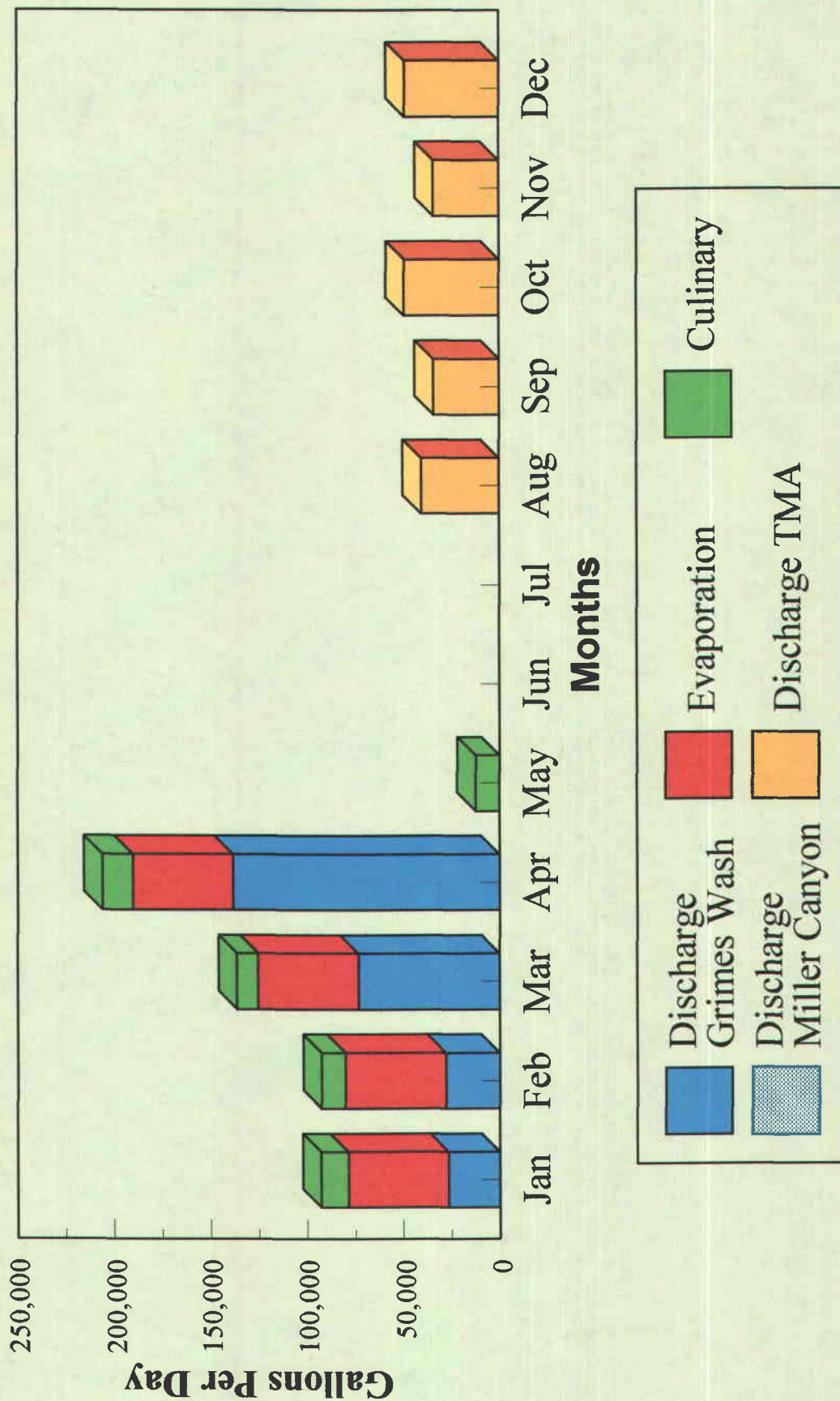
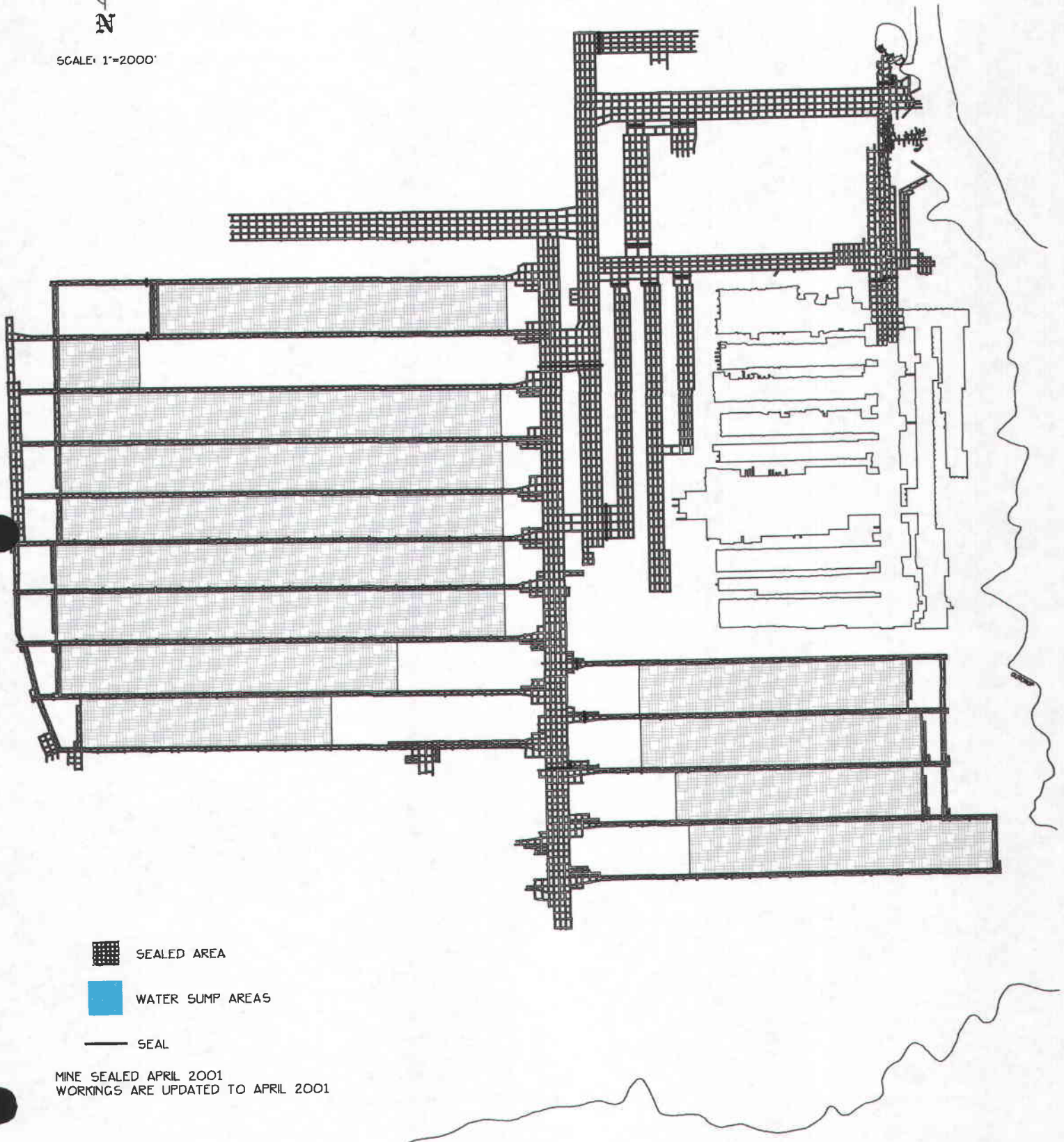


FIGURE 12  
TRAIL MOUNTAIN MINE  
WATER SUMP AREAS



SCALE: 1"=2000'



SEALED AREA



WATER SUMP AREAS

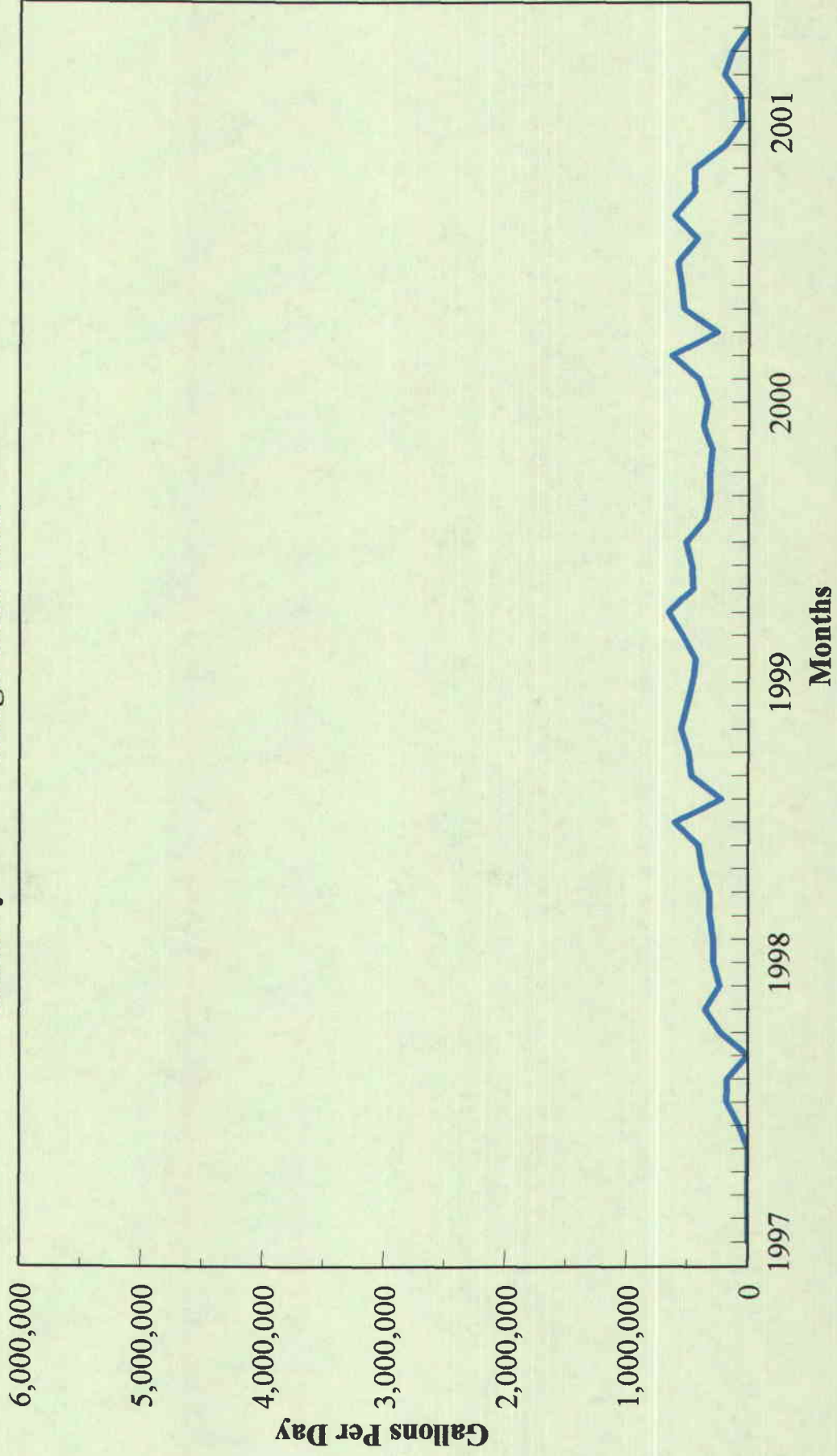
— SEAL

MINE SEALED APRIL 2001  
WORKINGS ARE UPDATED TO APRIL 2001

# FIGURE 13

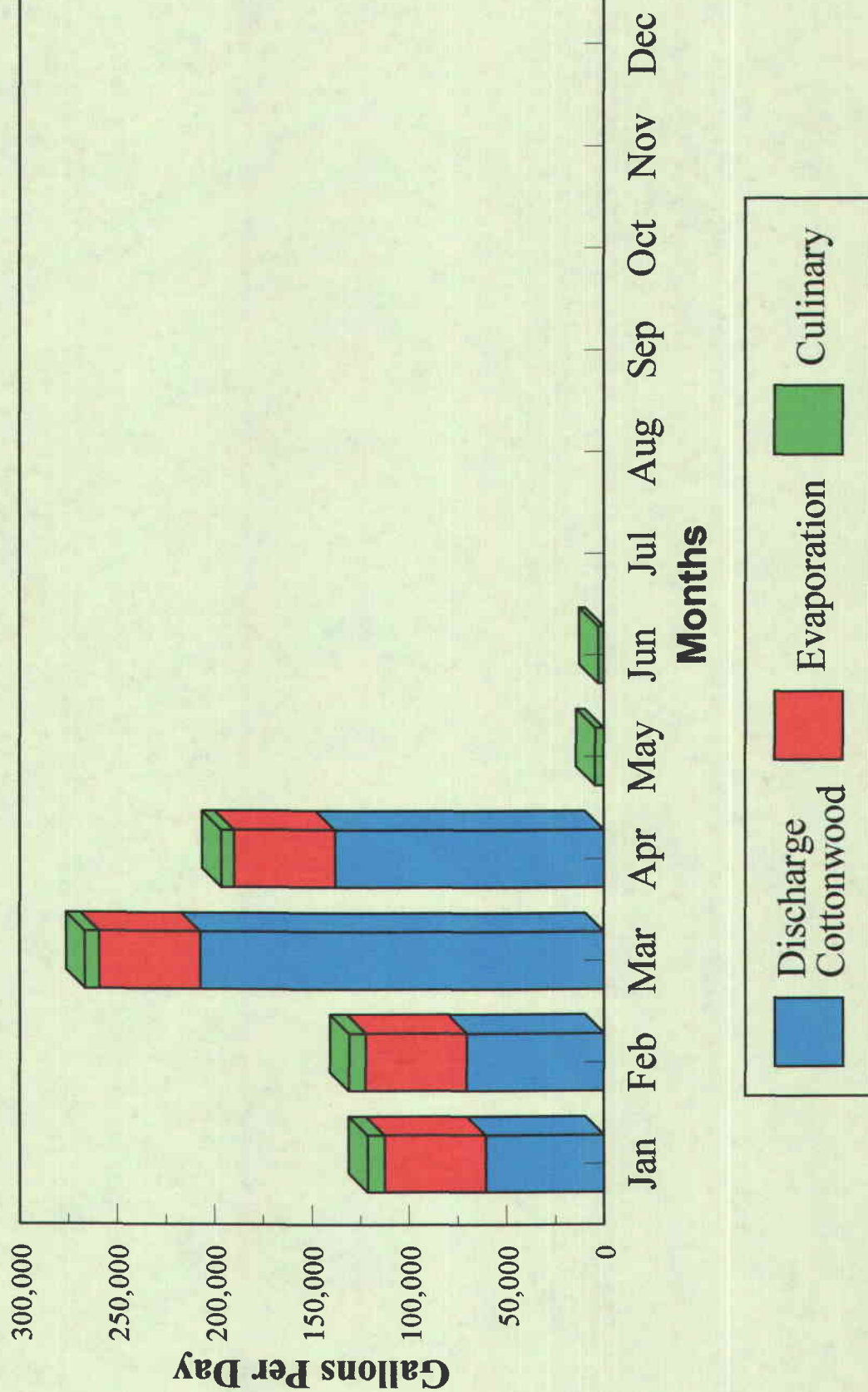
## Trail Mountain Mine

@ Cottonwood Canyon Creek (UPDES UT-0023728)  
January 1997 through December 2001





**FIGURE 14**  
**TRAIL MOUNTAIN**  
**2001 MINE WATER DISCHARGE**



**TABLE 1: PRECIPITATION IN EMERY COUNTY, UTAH (2001 Water Year)**

	Hunter Plant (Elev. 5800')		Huntington Plant (Elev. 6500')		Electric Lake (Elev. 8350')		East Mountain (Elev. 8985')	
	Precip. (inches)	% of Normal	Precip. (inches)	% of Normal	Precip. (inches)	% of Normal	Precip. (inches)	% of Normal
<b>2000</b>								
<i>October</i>	3.28	426	3.04	243	3.47	439	3.48	272
<i>November</i>	0.10	20	0.07	11	1.21	64	0.62	58
<i>December</i>	0.04	8	0.26	57	2.19	200	0.39	47
<b>2001</b>								
<i>January</i>	0.66	151	1.69	143	1.54	78	1.96	169
<i>February</i>	1.84	486	1.09	329	2.80	160	1.21	93
<i>March</i>	1.07	214	0.85	137	0.79	42	1.03	71
<i>April</i>	0.56	140	0.45	83	2.41	142	1.12	105
<i>May</i>	0.55	128	NR		1.49	101	1.39	148
<i>June</i>	0.20	45	NR		0.37	44	0.19	36
<i>July</i>	1.21	228	NR		1.56	131	0.58	58
<i>August</i>	0.36	36	NR		3.40	391	1.09	76
<i>September</i>	0.65	78	NR		1.01	96	0.12	8
<b>TOTALS</b>	10.52	152	7.45		22.24	115	13.17	98
<i>Mean Monthly</i>	0.88	---	1.06	---	1.85	---	1.10	---

NR - No Record



**TABLE 2: COMPARISON OF 2001 AND 2000 PRECIPITATION (Inches)**

<u>Station</u>	<u>2001</u>		<u>2000</u>		<u>2001 As % of 2000</u>
	<u>Amount</u>	<u>% of Normal</u>	<u>Amount</u>	<u>% of Normal</u>	
Hunter Plant	10.52	151	5.41	78	194
Huntington Plant	IR		9.12	84	
Electric Lake	22.24	114	22.11	114	101
East Mountain	13.17	98	10.16	76	130

IR - Incomplete Record

TABLE 3: HUNTER PLANT PRECIPITATION

Elevation - 5,800 Feet

<u>Water</u> <u>Year</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEPT</u>	<u>TOTAL</u>
75-76	0.13	0.25	0.19	0.02	0.40	0.00	0.89	0.84	0.03	0.31	0.08	0.70	3.84
76-77	0.00	0.02	0.00	0.37	0.07	0.00	0.03	1.28	0.07	1.35	0.41	0.50	4.10
77-78	0.01	0.18	0.00	1.28	1.05	1.74	0.34	1.21	0.00	0.69	1.14	0.14	7.78
78-79	0.03	2.22	0.22	1.43	0.53	2.43	0.24	0.47	0.00	0.00	0.79	0.00	8.36
79-80	0.00	0.00	0.41	1.70	1.70	0.67	0.75	1.11	0.00	0.02	0.51	2.06	8.93
80-81	0.66	0.06	0.02	0.00	0.07	1.48	0.16	0.45	0.14	0.20	0.70	2.43	6.37
81-82	0.58	0.27	0.45	0.94	0.45	0.54	0.00	0.02	0.00	0.15	1.06	1.23	5.69
82-83	0.20	1.25	0.45	0.54	0.41	0.84	0.37	0.51	0.00	2.18	1.58	0.88	9.21
83-84	0.53	0.66	1.07	0.03	0.35	0.34	0.34	0.05	1.09	1.80	1.89	2.35	10.50
84-85	1.60	0.06	1.24	0.20	0.95	1.01	0.67	0.64	0.26	1.50	0.03	0.86	9.11
85-86	0.92	1.40	0.42	0.10	0.97	0.40	0.31	0.00	0.31	0.55	1.01	0.57	7.05
86-87	0.92	0.08	0.10	0.32	0.45	0.90	0.12	1.38	1.25	1.65	1.27	0.11	8.55
87-88	1.91	1.02	0.66	0.55	0.00	0.66	1.64	0.59	0.20	0.69	0.44	0.78	9.14
88-89	0.69	0.04	0.48	1.23	0.02	0.23	0.00	0.37	0.14	1.01	1.70	0.35	6.26
89-90	0.20	0.00	0.03	0.31	0.72	0.71	0.51	0.06	0.24	0.56	0.38	1.11	4.73
90-91	0.04	0.00	0.19	0.02	0.29	0.77	0.10	1.09	0.58	0.94	0.53	2.11	6.66
91-92	0.17	0.50	0.14	1.04	2.72	0.87	0.22	1.56	0.34	0.22	1.60	0.52	9.90
92-93	0.81	0.07	0.78	1.44	1.67	1.18	0.50	0.92	0.15	0.05	0.93	0.05	8.55
93-94	1.54	0.51	0.08	Tr.	0.53	0.01	0.67	0.17	0.31	0.09	0.75	1.39	6.05
94-95	1.38	0.22	0.96	0.78	0.10	1.13	2.35	1.12	0.61	0.14	1.89	1.16	11.84
95-96	NA	NA	0.10	0.55	0.25	1.60	0.02	0.68	0.29	0.14	0.16	2.05	-----
96-97	1.04	2.34	0.46	1.45	0.03	0.00	0.79	0.50	1.27	1.41	2.17	2.73	14.19
97-98	0.20	0.46	0.20	0.15	2.04	0.09	0.41	0.31	0.55	0.56	0.73	1.72	7.42
98-99	1.69	0.93	0.00	0.13	0.33	0.00	1.66	0.34	0.34	0.08	2.78	1.03	9.31
99-00	0.00	0.00	0.00	0.61	0.92	0.69	0.16	1.06	0.50	0.44	0.53	0.50	5.41
00-01	3.28	0.10	0.04	0.66	1.84	1.07	0.56	0.55	0.20	1.21	0.36	0.65	10.52

**TABLE 4: HUNTINGTON PLANT PRECIPITATION**

Elevation - 6,500 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	---	---	---	---	---	0.08	0.29	0.16	0.11	0.57	0.63	0.43	2.27
71-72	2.26	0.59	1.62	0.04	0.00	0.32	0.28	0.16	0.77	0.40	0.66	1.07	8.17
72-73	4.27	1.28	0.34	0.49	0.80	2.42	0.50	0.17	0.97	1.09	1.94	0.12	14.39
73-74	0.08	0.02	0.37	0.20	0.03	0.01	0.00	0.00	0.00	0.09	0.00	0.07	0.87
74-75	0.68	1.19	1.13	1.01	0.30	0.80	0.03	0.75	1.44	2.62	0.31	0.24	9.50
75-76	0.23	0.95	0.03	0.20	0.23	0.00	2.34	0.86	0.02	0.73	0.19	0.85	6.63
76-77	0.56	0.00	0.00	0.35	0.00	0.00	0.00	1.76	0.00	2.08	0.96	0.70	6.41
77-78	0.66	0.12	0.82	1.45	1.00	1.36	0.94	0.72	0.12	0.05	0.72	0.77	8.73
78-79	0.02	2.65	0.25	1.21	0.52	2.50	0.00	0.84	0.05	0.09	3.32	0.20	11.65
79-80	0.17	0.14	0.15	2.88	3.63	0.68	1.13	1.88	0.65	0.18	0.38	2.22	14.09
80-81	1.20	0.06	0.00	0.00	0.00	0.62	0.08	1.75	0.48	0.00	0.58	1.53	6.30
81-82	1.12	0.25	1.30	1.63	0.20	0.73	0.00	0.17	0.00	0.08	0.71	1.91	8.10
82-83	0.20	0.60	0.67	0.16	0.65	1.87	0.08	0.40	0.00	1.61	0.39	1.15	7.78
83-84	0.76	0.76	2.13	0.10	0.15	1.18	0.72	0.17	1.04	0.74	1.39	0.46	9.60
84-85	2.07	0.34	1.74	0.49	0.27	0.53	0.44	1.08	0.42	3.21	0.04	0.81	11.44
85-86	0.77	1.28	0.64	0.01	0.98	0.28	0.43	0.10	0.17	0.42	0.55	1.08	6.71
86-87	0.38	0.15	0.05	0.81	0.66	0.13	1.22	1.48	1.01	2.14	0.65	0.00	8.68
87-88	1.36	1.35	0.51	1.77	0.00	0.10	1.35	0.94	0.83	0.04	0.13	0.92	9.30
88-89	0.31	0.13	0.83	0.68	0.28	0.21	0.20	0.22	1.28	0.78	1.72	0.74	7.38
89-90	0.21	0.28	0.42	0.51	1.18	0.94	1.30	1.35	0.65	1.30	1.27	2.35	11.76
90-91	0.45	0.03	0.43	0.44	0.37	0.68	0.13	3.13	0.60	1.14	1.87	2.38	11.61
91-92	0.21	0.99	0.37	1.20	1.98	1.55	0.47	1.92	1.97	2.99	1.53	0.60	15.78
92-93	1.93	1.02	1.67	2.32	1.71	1.87	0.46	0.65	0.31	0.08	1.68	0.46	14.16
93-94	2.11	0.88	0.23	0.12	0.88	1.17	1.69	0.53	0.05	Tr.	2.14	1.69	11.49
94-95	1.33	0.26	0.33	1.10	0.26	1.05	2.65	2.67	1.17	0.32	2.81	1.48	15.42
95-96	NA	NA	0.90	1.10	0.86	1.52	0.46	1.41	0.72	1.15	0.19	2.18	----
96-97	0.69	1.31	0.63	1.61	0.05	0.00	0.90	1.11	1.20	2.31	3.28	2.49	15.58
97-98	1.92	0.53	0.00	1.27	1.89	0.15	1.13	1.28	0.90	1.27	1.17	1.60	13.11
98-99	2.59	2.29	0.00	0.48	0.37	0.00	2.11	0.29	0.74	1.91	3.41	1.47	15.66
99-00	0.00	0.05	0.10	0.33	1.06	0.88	0.13	0.89	1.83	0.86	2.19	0.80	9.12
00-01	3.04	0.07	0.26	1.69	1.09	0.85	0.46	NR	NR	NR	NR	NR	

TABLE 5: ELECTRIC LAKE PRECIPITATION

Elevation - 8,350 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	2.46	2.35	6.41	1.13	1.66	0.36	1.05	0.66	0.47	0.40	2.15	0.78	19.88
71-72	3.49	1.69	4.07	3.35	0.58	0.70	1.02	0.28	1.49	0.70	0.80	2.91	21.08
72-73	4.18	3.43	3.27	0.97	2.09	2.74	3.67	1.42	0.85	0.82	1.23	1.15	25.82
73-74	0.79	1.90	3.52	2.70	1.12	1.52	2.49	0.20	0.13	2.09	0.06	0.09	16.61
74-75	2.27	0.62	1.73	2.10	2.37	3.42	1.23	3.21	1.08	1.93	0.49	0.25	20.70
75-76	1.31	2.57	0.82	1.44	2.23	1.35	1.47	2.00	1.23	1.07	0.54	1.19	17.22
76-77	1.00	0.25	0.14	0.76	1.14	2.00	0.05	3.00	0.90	2.28	1.31	1.26	14.09
77-78	1.47	2.10	3.20	3.68	2.74	3.16	2.46	1.18	0.30	0.10	0.24	0.77	21.40
78-79	0.40	3.18	2.66	2.90	2.18	2.53	0.72	1.67	0.19	0.96	2.29	0.32	20.00
79-80	1.55	2.23	0.37	4.95	6.01	3.34	1.27	3.09	0.12	0.37	0.38	1.80	25.48
10-Year	1.89	2.03	2.62	2.40	2.21	2.11	1.54	1.67	0.67	1.07	0.95	1.05	20.22
80-81	1.45	0.98	0.32	1.30	1.04	3.20	1.45	3.06	0.39	1.61	2.73	1.44	18.97
81-82	4.18	1.44	4.79	5.26	1.66	5.06	1.11	1.40	0.59	1.26	2.29	5.38	34.42
82-83	1.88	3.68	2.76	2.41	4.00	4.30	2.35	2.81	1.35	1.34	1.50	2.88	31.26
83-84	2.15	4.81	7.43	1.27	1.56	2.77	3.23	1.73	3.41	2.55	2.26	1.47	34.64
84-85	2.92	2.63	3.24	1.54	1.09	3.54	1.95	1.19	0.89	3.04	0.03	4.35	26.41
85-86	4.40	6.62	1.99	1.81	8.54	2.48	3.79	1.62	0.26	1.01	1.68	2.73	36.93
86-87	1.86	1.98	0.55	2.14	2.07	2.47	1.03	2.93	0.79	2.12	1.22	0.49	19.65
87-88	1.39	1.68	3.50	3.06	0.72	3.32	2.14	1.60	0.86	1.04	2.23	1.16	22.70
88-89	1.20	2.68	1.91	1.52	1.99	3.55	0.35	0.06	1.54	1.43	1.37	1.19	18.79
89-90	1.21	1.88	0.70	2.00	4.06	2.30	2.00	0.81	1.87	1.08	0.62	1.87	20.40
90-91	1.32	0.90	1.64	1.49	1.64	4.24	3.06	2.60	0.57	1.04	1.39	2.70	22.56
91-92	1.43	2.10	0.87	0.72	2.21	1.95	0.54	1.55	1.01	0.59	1.64	1.02	15.63
92-93	1.51	1.33	3.60	5.01	4.76	2.25	2.49	2.40	1.57	0.48	1.32	0.60	27.32
93-94	2.10	2.19	0.90	1.00	4.00	1.10	2.81	0.99	0.10	0.25	0.75	2.32	18.51
94-95	2.40	4.26	1.60	3.25	1.90	3.84	3.94	5.07	2.04	1.00	2.53	1.95	33.78
95-96	1.54	1.38	3.54	5.84	3.25	3.23	1.75	1.73	0.90	1.09	0.45	2.20	26.90
96-97	1.43	2.35	3.90	4.00	1.31	0.77	1.97	2.03	1.03	0.64	1.98	4.45	25.86
97-98	2.30	1.88	2.00	3.65	3.60	2.86	1.80	1.82	2.30	2.01	1.86	1.68	27.76
98-99	3.65	2.98	1.15	4.05	1.70	1.44	4.95	2.03	1.28	2.90	3.54	1.20	30.87
99-00	0.15	0.38	1.61	4.19	4.45	1.98	0.66	2.12	2.32	0.00	2.60	1.65	22.11
00-01	3.47	1.21	2.19	1.54	2.80	0.79	2.41	1.49	0.37	1.56	3.40	1.01	22.24

NOTE: Climatic Station was moved from a point one mile above the dam site to a point 500 feet below dam site on November 15, 1973. October, November, and December 70-71 were estimated by correlation with Clear Creek Weather Station.

TABLE 6: EAST MOUNTAIN PRECIPITATION

Elevation - 8,985 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
80-81	1.28	0.39	0.05	0.29	0.52	2.77	0.64	0.87	0.11	0.57	0.85	2.55	10.90
81-82	1.93	0.53	0.97	3.22	0.14	1.67	0.00	0.45	0.09	1.86	1.10	2.61	14.57
82-83	0.38	2.90	1.39	1.30	1.81	1.98	0.92	0.71	0.61	1.27	4.83	1.62	19.71
83-84	0.76	2.43	2.42	0.27	0.65	1.22	0.50	0.22	1.18	1.90	2.33	0.64	14.53
84-85	3.27	0.97	1.67	0.49	0.59	1.77	1.35	1.73	0.28	2.47	0.12	2.31	17.02
85-86	1.15	2.38	0.87	0.30	2.10	1.43	1.05	0.38	0.53	0.87	2.24	1.63	14.92
86-87	1.57	0.39	0.16	1.37	1.37	1.65	1.16	1.77	0.58	2.49	1.16	0.06	13.73
87-88	2.77	1.91	1.29	1.42	0.00	0.99	2.08	1.03	0.81	0.45	0.96	0.91	14.61
88-89	0.61	0.43	1.56	1.00	0.68	1.03	0.26	0.47	0.43	1.19	2.44	0.49	10.59
89-90	0.28	0.39	0.16	0.74	2.08	1.75	1.03	0.26	0.67	0.88	1.03	1.62	10.90
10-Year	1.40	1.27	1.05	1.04	0.99	1.63	0.90	0.79	0.53	1.40	1.71	1.44	14.15
90-91	0.48	0.26	0.66	0.34	0.39	2.34	0.59	1.83	0.21	1.01	1.48	3.11	12.69
91-92	0.49	1.07	0.07	0.61	1.73	2.39	0.56	2.19	0.95	0.85	0.48	0.35	11.74
92-93	1.57	0.57	1.53	4.10	2.34	2.01	0.33	0.72	0.19	0.04	0.82	0.14	14.37
93-94	2.23	1.12	0.14	0.32	1.35	0.34	2.65	0.36	0.39	0.10	0.83	1.49	11.33
94-95	1.86	1.42	0.65	1.37	0.66	0.79	3.75	2.29	1.19	0.34	1.52	0.62	16.46
95-96	0.18	0.46	0.64	1.39	1.18	2.23	0.21	1.14	0.30	0.58	0.35	3.46	12.12
96-97	1.50	1.63	1.66	2.49	1.56	0.00	0.40	0.91	0.15	0.15	1.30	2.43	11.75
97-98	0.24	0.84	0.23	0.97	3.34	0.71	0.81	0.37	0.04	0.78	0.57	2.16	11.06
98-99	3.01	1.08	0.00	0.75	0.34	0.07	2.82	0.36	1.21	2.08	2.24	0.78	14.73
99-00	0.04	0.05	0.28	0.48	3.27	1.56	0.15	0.72	0.59	0.03	2.03	0.96	10.16
20-Year	1.28	1.06	0.82	1.16	1.30	1.43	1.06	0.94	0.53	1.00	1.43	1.50	13.39
00-01	3.48	0.62	0.39	1.96	1.21	1.03	1.12	1.39	0.19	0.58	1.09	0.12	13.17

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TABLE 7: TEMPERATURES IN EMERY COUNTY, UTAH (2001 Water Year)

	Hunter Plant			Huntington Plant			Electric Lake			East Mountain		
	Average Temperature*	Departure From Normal	Departure From Normal	Average Temperature*	Departure From Normal	Departure From Normal	Average Temperature*	Departure From Normal	Departure From Normal	Average Temperature*	Departure From Normal	Departure From Normal
2000												
October	52.0	0.6		47.8	-1.6		35.6	-2.0		43.8	3.7	
November	33.0	2.2		28.4	-7.6		17.0	-9.3		25.5	-3.5	
December	31.6	4.9		26.8	-0.6		17.2	1.4		15.6	-6.0	
2001												
January	25.4	1.3		27.6	1.0		12.0	-2.6		13.0	-9.2	
February	29.4	1.0		26.2	-4.0		17.3	-2.0		13.2	-11.5	
March	44.8	9.0		39.6	1.9		25.2	4.4		22.2	-7.8	
April	49.8	2.2		45.0	-1.1		31.7	3.0		28.2	-8.5	
May	61.6	9.5		NR			45.5	6.5		41.0	-3.9	
June	70.4	9.0		NR			52.3	3.7		50.2	-6.0	
July	73.2	4.8		NR			55.4	-0.3		58.1	-5.4	
August	73.6	7.2		NR			56.7	2.9		53.6	-8.7	
September	67.4	15.5		NR			48.6	1.1		51.1	-1.9	
AVERAGE	51.0	5.6					34.5	0.6		34.6	-5.7	

\* Temperatures reported in degrees Fahrenheit.

**TABLE 8: COMPARISON OF 2000 AND 2001 TEMPERATURES\***

<u>Station</u>	<u>2001</u>		<u>2000</u>		<u>2001 Departure From 2000</u>
	<u>Average Temperature</u>	<u>Departure From Normal</u>	<u>Average Temperature</u>	<u>Departure From Normal</u>	
<i>Hunter Plant</i>	51.0	5.7	53.6	7.8	-2.6
<i>Huntington Plant</i>	IR		51.0	3.1	
<i>Electric Lake</i>	34.5	1.4	36.1	2.1	-1.6
<i>East Mountain</i>	34.6	-5.7	46.1	5.5	-11.5
<i>Average Departure From Normal</i>		0.5		4.6	-5.2

\* Temperatures reported in degrees Fahrenheit.

IR - Incomplete Record

**TABLE 9: HUNTINGTON CREEK WATER FLOWS (2001 Water Year)**

	<u>Huntington Creek Below Electric Lake*</u>	<u>Huntington Creek At Plant*</u>	<u>Calc. Natural Flow at Plant</u>
<i>Total Yearly Flow (Acre Feet)</i>	14,992	40,090	45,994
<i>% of Normal</i>	69	59	65
<i>Mean Discharge in Cubic Feet Per Second (CFS)</i>	20.7	55	
<i>Maximum Discharge (CFS)</i>	82.1	221	
<i>Date of Maximum Discharge</i>	09/12/2001	05/17/2001	
<i>Minimum Discharge (CFS)</i>	11.8	12.3	
<i>Date of Minimum Discharge</i>	01/27/2001	12/09/2000	

\* Influenced by upstream storage in Electric Lake.



**TABLE 10: COMPARISON OF 2000 AND 2001 RUNOFF VALUES**

	2000		2001		<i>2001 as a % of 2000</i>
	<i>Amount</i>	<i>% of Normal</i>	<i>Amount</i>	<i>% of Normal</i>	
<i>Spring Runoff Stored in Electric Lake (Acre Feet)</i>	5,022	48	4,424	43	88
<i>Calculated Natural Flow at Plant (Acre Feet)</i>	59,716	84	45,994	65	77

TABLE 11: HUNTINGTON CREEK WATER QUALITY \*  
HCC01 - ABOVE POWER PLANT

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010314		251	53		15	574	12.20	231	0.10		24			8.43	2	15	45	11	290
20010627		194	45	5	5	413		170	0.30		14			8.61		5	18	29	196
20010913		170	43		9	348	11.10	11	0.50		11			8.61	1	6	14	37	202
20011213		265	58		10	502	13.60	248			25			8.44	1	10	42	7	283
2001** MIN		170	43	5	5	348	11.10	153	0.10		11			8.43	1	5	14	7	196
2001** MAX		265	58	5	15	574	13.60	248	0.50		25			8.61	2	15	45	37	290
2001** MEAN		220	50	5	10	459	12.30	201	0.30		19			8.52	2	9	30	21	243
No. of Analysis	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN		176	41	6	3	304	5.40	148	0.20		11			8.28	1	2	10	10	168
2000** MAX		254	57	6	18	490	12.00	233	0.20		22			8.53	1	13	36	27	285
2000** MEAN		216	50	6	9	398	9.58	193	0.20		17			8.39	1	7	22	19	229
1999** MIN		185	45	6	2	305	6.00	158	0.10		11			8.05	2	4	7	7	179
1999** MAX		275	58	6	10	500	7.90	252	0.90		26			8.49	2	10	41	111	305
1999** MEAN		225	51	6	7	401	6.60	201	0.43		18			8.34	2	8	23	37	239
1998** MIN		126	46	5	7	346	5.5	164	0.2		12			7.32	1	5	17	8	209
1998** MAX		268	55	38	7	475	9.2	225	0.5		22			8.65	1	8	28	100	275
1998** MEAN		210	50.5	21	7	412	7.15	198	0.3		17.5			8.06	1	6.25	22.25	34	240
1997** MIN		174	39	8	5	303	6.50	139	0.10		10			8.18	1	3	13	17	170
1997** MAX		282	57	8	14	476	9.60	229	13.30		21			8.50	1	7	33	504	250
1997** MEAN		217	48	8	9	377	7.98	179	4.57		15			8.35	1	5	19	179	210
1996** MIN	9.0	167	46.0	19.0	5.0	304	8.80	164	0.08		12.00		2.0	8.38	1.00	3.00	8.0	5.0	157
1996** MAX	20.0	246	64.0	24.0	16.0	533	11.60	263	0.60		25.00		2.0	8.54	2.00	11.00	38.0	32.0	272
1996** MEAN	14.5	200	54.3	22.0	10.5	410.5	10.33	210.25	0.39		18.25		2.0	8.45	1.40	6.75	22.5	17.3	215
1995 MIN	10.0	165	47.0	5.0	4.0	287	3.80	167	0.10	0.10	12.00	0.10	5.0	8.10	1.00	4.00	7.0	5.0	170
1995 MAX	10.0	255	57.0	15.0	14.0	441	9.20	228	1.40	0.10	22.00	0.10	5.0	8.81	2.00	11.00	29.0	70.0	260
1995 MEAN	10.0	204	53.3	10.0	9.0	360.5	6.75	203.75	0.58	0.10	17.50	0.10	5.0	8.56	1.25	7.25	18.5	30.0	208
1994 MIN	10.0	173	40.0	1.0	2.0	310	6.2	149	0.10	0.20	11.00	0.10	5.0	8.17	1.00	3.00	2.0	4.0	170
1994 MAX	10.0	249	57.0	5.0	30.0	484	9.9	235	0.20	0.20	23.00	0.20	7.0	8.88	5.00	11.00	40.0	40.0	280
1994 MEAN	10.0	211	50.6	2.0	10.6	379	7.8	193	0.19	0.28	16.42	0.14	5.3	8.60	3.00	6.17	19.7	15.9	224
1993 MIN	0.0	159	32.7	0.0	1.0	309	4.3	118	0.05	0.10	9.00	0.00	0.0	7.80	0.00	1.00	3.0	6.0	164
1993 MAX	3.0	253	76.4	6.0	20.0	640	10.5	275	0.25	1.95	25.60	0.20	5.0	9.17	2.00	19.60	60.0	95.0	330
1993 MEAN	0.6	210	51.6	1.2	9.7	410	7.1	202	0.14	0.54	17.82	0.60	1.2	8.42	0.71	7.65	26.0	25.9	228
1992 MIN	0.1	189	40.3	0.1	10.0	309	5.8	177	0.01	0.01	11.30	0.01	0.1	8.01	0.01	1.24	5.0	1.0	134
1992 MAX	17.0	281	80.7	6.0	23.0	475	10.1	289	0.10	0.25	30.00	0.07	3.7	8.90	3.12	23.00	70.0	25.0	269
1992 MEAN	2.1	224	60.9	2.4	13.8	385	8.1	234	0.03	0.09	19.80	0.02	0.9	8.58	0.54	8.09	33.7	9.3	210
1991 MIN	1.0	183	46.7	0.0	0.0	210	7.1	189	0.00	0.00	12.30	0.00	0.0	7.1	0.00	1.20	17.0	0.0	170
1991 MAX	25.0	288	77.9	11.0	45.0	460	10.5	288	0.20	0.33	35.50	0.06	3.9	8.4	4.52	9.03	80.0	85.0	369
1991 MEAN	4.8	227	64.9	1.9	21.5	341	8.6	245	0.06	0.14	20.03	0.03	1.2	8.1	0.91	4.57	36.8	17.7	243
HISTORICAL 1991-2000 MIN	0.1	126	32.7	0.1	1.0	210	3.8	118	0.01	0.01	9.00	0.01	0.1	7.10	0.01	1.00	2.0	1.00	134
HISTORICAL 1991-2000 MAX	25.0	400	102.6	38.0	45.0	640	12.0	392	13.30	0.25	44.70	0.30	7.0	8.90	5.00	55.00	130.0	504.00	369
HISTORICAL 1991-2000 MEAN	5.1	224	57.3	4.3	13.1	391	8.1	220	0.44	0.10	18.60	0.07	2.5	8.37	1.34	7.66	29.5	23.10	230
No. of Analysis	61	79	79	63	78	89	89	79	69	58	79	57	53	89	63	78	79	85	89

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 12: HUNTINGTON CREEK WATER QUALITY \*

HCC02 - @ POWER PLANT (BELOW DEER CREEK CONFLUENCE)

2001** SAMPLE DATES	ALKALINITY BICARBONATE	ACIDITY	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	GREASE	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010314	257		53		29	642	12.10	239	0.10		26			8.30	2	22	52	12	325
20010627	191		45	8	6	432					15			8.60			6	19	30
20010913	172		44		9	364	11.00	159	0.60		12			8.65			6	16	33
20011213	284		59		32	590	14.20	259			27			8.46	2	23	51	9	338
2001** MIN	172		44	8	6	364	11.00	159	0.10		12			8.30	2	6	16	9	200
MAX	284		59	8	32	642	14.20	259	0.60		27			8.65		23	52	33	338
MEAN	226		50	8	19	507	12.43	207.75	0.37		20			8.50	2	14	35	21	268
No. of Analysis	4		4	4	4	4	3	4	4	4	4		4	4	4	4	4	4	4
2000** MIN	175		41	5	5	316	5.90	148	0.10		11			8.27	1	3	14	15	169
MAX	279		60	5	34	587	11.90	261	0.20		27			8.52	2	22	65	27	339
MEAN	226		50	5	17	456	10.03	206.5	0.17		20			8.36	2	12	36	21	257
1999** MIN	188		45	6	3	311	6.20	158	0.20		11			8.35	2	1	8	6	183
MAX	285		64	16	18	597	8.60	296	0.90		33			8.56	2	21	68	119	365
MEAN	232		53	10	11	442	7.08	219.5	0.47		21			8.47	2	10	34	41	263
1998** MIN	152		47	6	6	353	6.10	174	0.10		13			7.69	1	7	15	7	221
MAX	265		58	37	29	562	9.20	448	0.40		25			8.56	2	18	38	60	323
MEAN	210		52	23	15	453.25	8.05	259.75	0.20		20			8.12	2	11	27	25	266
1997** MIN	175		40	7	5	309	6.20	141	0.20		10			8.20	1	4	13	18	170
MAX	292		56	7	10	491	9.60	230	1.10		22			8.52	1	8	35	490	260
MEAN	221		47	7	8	384	7.93	177.00	4.00		15			8.35	1	6	20	177	205
1996** MIN	174	6.0	46.0	12.0	6.0	304	7.70	164	0.10		12.00			8.37	1.30	3.00	8.0	5.0	165
MAX	279	26.0	64.0	20.0	17.0	522	11.70	267	0.60		26.00			8.56	2.00	11.00	42.0	32.0	278
MEAN	210	16.0	54.3	14.7	11.0	407.5	10.00	211.25	0.40		18.50			8.45	1.65	6.75	23.8	18.3	221
1995 MIN	160	10.0	46.0	5.0	4.0	283	3.80	164	0.10		12.00			7.97	1.00	4.00	10.0	10.0	180
MAX	250	10.0	64.0	15.0	14.0	442	7.80	230	1.60		22.00			8.89	2.00	11.00	31.0	100.0	260
MEAN	201	10.0	55.5	10.0	9.5	357	6.43	213	0.63		17.50			8.50	1.50	7.25	20.5	40.0	210
1994 MIN	176	10.0	46.0	1.0	1.0	313	5.0	156	0.10		10.00			8.30	5.00	3.00	10.0	4.0	167
MAX	250	10.0	58.0	5.0	12.0	490	9.9	240	0.20		23.00			8.98	10.00	12.00	50.0	30.0	290
MEAN	212	10.0	52.5	2.1	6.7	386	7.5	200	0.19		16.58			8.62	3.36	6.50	23.3	13.5	221
1993 MIN	151	0.0	32.0	0.0	1.3	413	3.1	129	0.05		8.00			8.24	0.00	3.40	4.0	8.0	161
MAX	250	1.0	78.1	6.0	35.0	535	8.2	288	0.20		28.00			8.96	4.00	23.00	50.0	98.0	361
MEAN	206	0.1	53.8	1.4	13.3	418	5.9	209	0.11		18.23			8.67	1.08	11.10	28.4	25.8	254
1992 MIN	195	0.1	40.1	0.1	10.0	328	4.9	183	0.01		8.40			7.89	0.01	1.52	14.0	2.0	185
MAX	285	33.0	82.9	7.0	25.0	604	9.8	334	0.19		35.30			8.97	3.42	21.85	90.0	28.0	371
MEAN	239	4.5	63.2	2.1	17.5	456	7.8	255	0.05		23.54			8.64	0.97	11.25	45.6	12.1	252
1991 MIN	183	0.0	49.1	0.0	10.0	210	5.8	179	0.00		13.76			7.5	0.00	2.00	15.0	3.0	174
MAX	300	14.0	83.1	1.0	45.0	700	10.3	353	0.21		35.30			8.5	4.90	22.94	130.0	77.0	425
MEAN	233	2.1	69.6	0.8	25.0	406	8.4	263	0.04		21.55			8.1	1.31	10.00	55.0	19.6	278
HISTORICAL 1991-2000 MIN	151	0.1	32.0	0.1	1.0	210	3.8	129	0.01		8.00			7.14	0.01	1.00	4.0	1.00	161
MAX	310	33.0	91.7	37.0	45.0	700	11.7	448	1.50		39.90			8.98	5.00	23.00	150.0	490.00	425
MEAN	226	5.6	59.4	4.3	14.8	426	7.9	235	0.42		20.33			8.39	1.71	9.54	39.2	24.00	257
No. of Analysis	78	59	78	64	77	88	88	78	71	57	78	55	54	88	61	78	78	85	88

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 13: HUNTINGTON CREEK WATER QUALITY \*  
HCC04 - @ RESEARCH FARM

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010314		257	56		39	685	11.80	259	0.10		29			8.39	2	27	68	8	360
20010627		197	46	5	8	429		177			15			8.59		8	24	29	197
20010917		181	46		12	382		168	0.30		13			8.51		8	20	27	201
20011213		294	67		51	727	11.50	303			33			8.36	2	35	87	9	432
2001** MIN		181	46	5	8	382	11.50	168	0.10		13			8.36	2	8	20	8	197
MAX		294	67	5	51	727	11.80	303	0.30		33			8.59	2	35	87	29	432
MEAN		232	54	5	27	556	11.65	227	0.20		23			8.46	2	20	50	18	298
No. of Analysis	4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN		175	42	8	7	328	6.50	4	0.20		12			8.35	2	3	17	10	187
MAX		268	61	8	32	640	11.80	268	0.20		29			8.45	2	23	74	31	371
MEAN		225	52	8	20	484	9.80	173	0.20		21			8.38	2	13	45	21	276
1999** MIN		188	45	7	3	316	6.00	162	0.20		12			8.39	2	2	9	6	182
MAX		275	64	8	33	688	7.60	308	0.90		36			8.58	3	24	98	125	431
MEAN		228	54	8	18	482	6.75	228	0.50		23			8.48	3	12	46	44	289
1998** MIN		96	46	18	8	361	7.10	168	0.10		13			8.01	2	6	16	6	217
MAX		266	57	44	36	613	8.70	249	0.80		26			8.45	2	22	57	197	353
MEAN		203	52	31	20	476	8.05	216	0.43		21			8.25	2	14	39	62	288
1997** MIN		175	40	5	7	365	6.50	145	0.10		11			8.22	1	5	17	15	200
MAX		271	60	5	20	570	9.50	257	10.10		26			8.55	1	14	59	458	330
MEAN		215	48	5	12	444	8.03	186	3.50		16			8.37	1	8	30	164	250
1996** MIN		160	47.0	16.0	6.0	318	7.80	167	0.08		12.00			8.36	1.00	5.00	16.0	5.0	180
MAX	23.0	271	68.0	33.0	23.0	602	11.80	293	0.70		30.00		2.0	8.44	2.00	15.00	62.0	20.0	325
MEAN	16.0	200	56.0	23.7	15.0	443.75	9.98	221.5	0.39		20.00		2.0	8.42	1.33	9.75	35.5	15.0	244.25
1995 MIN	10.0	165	49.0	5.0	6.0	311	4.20	176	0.10	0.10	13.00	0.10	5.0	7.90	1.00	3.00	15.0	5.0	180
MAX	10.0	250	65.0	15.0	21.0	500	8.50	264	1.70	0.10	27.00	0.10	5.0	8.69	2.00	17.00	71.0	95.0	330
MEAN	10.0	200	57.5	11.3	13.8	409.25	6.83	225	0.63	0.10	19.75	0.10	5.0	8.47	1.25	10.25	37.0	35.0	230
1994 MIN	10.0	176	40.0	1.0	2.0	324	5.2	150	0.10	0.10	11.00	0.10	5.0	8.11	2.00	4.00	13.0	7.0	180
MAX	10.0	250	64.0	5.0	30.0	610	9.6	275	0.20	0.80	28.00	0.20	5.0	8.94	5.00	21.00	80.0	33.0	360
MEAN	10.0	213	54.0	2.1	11.7	432	7.6	213	0.19	0.29	19.00	0.14	5.0	8.61	3.25	9.92	34.5	16.0	255
1993 MIN	0.0	130	35.3	0.0	8.5	297	2.2	149	0.05	0.14	9.90	0.00	0.0	7.82	0.00	4.60	17.0	0.0	170
MAX	6.0	269	82.3	6.0	61.2	729	7.6	310	0.37	2.46	33.00	0.20	5.0	8.97	5.00	58.60	110.0	80.0	436
MEAN	0.9	214	57.0	1.8	21.3	462	5.4	235	0.14	0.89	22.67	0.05	0.7	8.66	1.03	16.64	55.8	26.1	285
1992 MIN	0.1	201	42.4	0.1	10.0	354	4.3	194	0.01	0.01	12.80	0.01	0.1	7.35	0.01	3.96	19.0	1.0	197
MAX	25.0	326	92.0	10.0	30.0	762	9.6	397	0.19	1.12	41.80	0.08	2.8	8.89	3.59	22.35	170.0	37.0	469
MEAN	4.0	250	67.2	2.2	19.6	516	7.5	276	0.06	0.18	26.19	0.02	0.6	8.51	0.97	16.61	78.3	15.0	298
1991 MIN	0.0	187	40.6	0.0	10.0	220	6.6	163	0.00	0.00	13.70	0.00	0.0	7.70	0.00	3.79	17.0	2.0	182
MAX	8.0	317	88.3	1.0	45.0	640	10.0	393	0.15	10.00	42.00	0.08	1.8	8.50	4.70	28.78	170.0	82.0	469
MEAN	1.6	233	71.2	0.8	25.4	410	8.1	278	0.04	0.94	24.43	0.02	0.8	8.20	1.20	12.78	70.8	22.7	309
HISTORICAL 1991-2000 MIN	0.1	96	35.3	0.1	2.0	220	4.2	145	0.01	0.01	9.90	0.01	0.1	7.35	0.01	2.00	9.0	1.00	170
MAX	25.0	326	108.1	44.0	61.2	762	11.8	397	10.10	0.37	42.00	0.30	5.0	8.94	10.70	58.60	170.0	458.00	469
MEAN	5.1	228	61.1	4.7	18.2	459	7.9	243	0.47	0.10	22.50	0.07	2.4	8.40	1.82	12.90	55.3	26.50	287.2
No. of Analysis	59	78	78	62	78	87	88	78	68	56	78	55	48	88	63	78	78	84	88

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\*Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 14: DEER CREEK SURFACE WATER QUALITY \*  
DCR01 - ABOVE THE MINE

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	IDS
20010629		321	46		5	620	222	0.20		26			8.30		31	41	35	307
20010913		317	41	8	7	662	226			30			8.72		45	63		366
2001**																		
MIN		317	41	8	5	620	222	0.20		26			8.30		31	41	35	307
MAX		321	46	8	7	662	226	0.20		30			8.72		45	63	35	366
MEAN		319	44	8	6	641	224	0.20		28			8.51		38	52	35	337
No. of Analysis	2																	
2000**																		
MIN		307	39		4	547	218		2	28		2	2.00	2	2	2	2	2
MAX		325	41	6	6	615	233			33			8.45		42	46	6	329
MEAN		316	40	5	5	581	226			31			8.48		48	74	6	378
1999**													8.47		45	60	6	354
MIN		326	45		4	513	231	0		27			7.83		31	31	20	295
MAX		328	48	6	6	583	240	0		31			8.45		40	49	20	330
MEAN		327	47	5	5	548	236	0		29			8.14		36	40	20	313
1998**																		
MIN		292	44	17	7	553	227	1		23			8.03		25	27	5	330
MAX		301	53	19	8	604	238	1		31			8.21		40	54	92	343
MEAN		297	49	18	8	579	233	1		27			8.12		33	41	49	337
1997**																		
MIN		329	43.0	16.0	6.0	533	216			24.00			8.48		26.0	30.0	22	340
MAX		393	47.0	16.0	15.0	587	247			30.00			8.52		41.0	55.0	22	380
MEAN		361	45.0	16.0	10.5	560	232			27.00			8.50		33.5	42.5	22	360
1996**																		
MIN		279	44	12	7	518	245	0		28			8.50	1	34	40	19	294
MAX		288	52	18	9	616	262	0		37			8.59	1	40	66	19	365
MEAN		284	48	15	8	567	254	0		33			8.55	1	37	53	19	330
1995																		
MIN	10	280	50	15	6	503	240	0	0	25	0	5	7.44	1	27	26	5	250
MAX	10	280	56	15	8	530	269	0	0	35	0	5	8.81	1	43	52	25	360
MEAN	10	280	53	15	7	517	255	0	0	30	0	5	8.13	1	35	39	15	305
1994																		
MIN	No samples taken in 1994 - No flow.																	
MAX																		
MEAN																		
1993																		
MIN	0.0	241	36.0	0.0	5.6	484	193	0.05	0.07	19.30	0.03	0.0	8.26	0.94	20.00	36.0	1.0	284
MAX	2.0	373	94.2	9.0	9.0	580	343	0.35	8.10	37.00	0.20	1.3	8.73	2.20	45.70	100.0	31.0	377
MEAN	0.3	307	58.9	1.0	7.6	528	263	0.18	1.52	28.28	0.08	0.3	8.61	1.59	30.28	54.5	13.0	333
1992																		
MIN	0.0	335	59.3	0.0	20.0	540	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325
MAX	0.0	335	59.3	0.0	20.0	540	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325
MEAN	0.0	335	59.3	0.0	20.0	540	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325
1991																		
MIN	No flow 1991 back to 1989																	
MAX																		
MEAN																		
HISTORICAL 1978-2000																		
MIN	0.1	241	2.2	0.1	3.5	360	193	0.01	0.01	19.30	0.01	0.1	6.97	0.01	13.40	10.0	0.50	231
MAX	137.0	397	107.2	19.0	176.0	1580	599	40.10	0.35	83.90	0.24	5.0	8.81	4.33	111.60	255.0	3592	897
MEAN	11.3	311	55.0	5.5	19.0	593	284	0.83	0.09	34.98	0.04	1.2	8.00	1.26	32.76	63.0	96.80	347
No. of Analysis	27																	
Analysis		37	37	30	38	77	37	71	20	37	66	25	78	29	37	39	74	78

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 15: DEER CREEK SURFACE WATER QUALITY \*  
DCR06 - BELOW THE MINE

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unho)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010314		304	61		198	1534	358			50			8.52	5	141	136		764
20010629		301	47		86	904	261			35			8.40	2	68	77		465
20010913		298	50		39	777	302			43			8.65	5	36	110	6	452
20011211		327	68		177	1364	396	0.10		55			8.44	5	137	136	9	779
2001** MIN		298	47		39	777	261	0.10		35			8.40	2	36	77	6	452
MAX		327	68		177	1364	396	0.10		55			8.65	5	137	136	9	779
MEAN		309	55		101	1015	320	0.10		44			8.50	4	80	108	8	565
Analysis	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	2	4
2000** MIN		286	51		59	858	309	0		44			8	5	50	99	5	494
MAX		332	65		77	945	389	1		55			8	6	57	161	63	551
MEAN		313	56	6	68	889	341	0		49			8	5	53	128	25	520
1999** MIN		297	58	7	48	822	330	0		44			8	4	40	126	5	492
MAX		354	74	7	55	952	440	1		62			9	6	51	177	42	613
MEAN		331	64	7	52	866	367	1		50			8	5	47	143	24	532
1998** MIN		278	64	38	66	952	325	0.10		40.00			8	3	56	127	11	582
MAX		365	74	38	102	1061	415	1.90		56.00			9	7	89	163	84	640
MEAN		320	67	38	85	1007	369	0.90		48.67			8	5	72	147	58	618
1997** MIN		295	46	10	83	806	243	0.20		31.00			9	1	62	65	6	490
MAX		320	103	10	1112	4590	529	0.20		66.00			9	6	758	132	32	2460
MEAN		305	68	10	467	2239	366	0.20		47.33			9	3	320	108	18	1243
1996** MIN		244	56	23	132	1022	313	0		42			9	2	99	84	13	597
MAX		244	56	23	132	1022	313	0		42			9	2	99	84	13	597
MEAN		244	56	23	132	1022	313	0		42			9	2	99	84	13	597
1995 MIN	10	250	66	20	111	936	330	0	0	41	0	5	8	2	79	70	5	490
MAX	10	255	66	25	279	1270	400	0	0	57	0	5	9	3	199	120	30	900
MEAN	10	253	66	23	195	1103	365	0	0	49	0	5	8	3	139	95	18	695
1994 MIN																		
MAX																		
MEAN																		
1993 MIN	0.0	274	38.2	0.0	35.4	724	260	0.04	0.06	34.00	0.00	0.0	7.75	2.20	34.00	90.0	1.0	413
MAX	1.0	431	95.3	9.0	205.0	1360	483	0.30	2.70	65.00	0.10	5.0	8.81	10.30	138.00	190.0	200.0	862
MEAN	0.1	315	68.3	2.5	85.8	961	375	0.14	0.46	49.61	0.04	1.0	8.43	4.94	68.91	161.8	30.7	620
1992 MIN	0.1	162	46.1	0.1	20.0	692	313	0.01	0.01	41.20	0.01	0.1	7.80	2.53	28.19	78.0	3.0	446
MAX	28.0	356	129.8	6.0	60.0	1340	703	0.23	0.57	91.90	0.09	1.7	8.94	9.23	77.76	600.0	97.0	1001
MEAN	6.2	296	82.1	0.9	39.6	889	429	0.04	0.08	54.41	0.02	0.7	8.56	6.09	50.08	219.0	26.3	581
1991 MIN	<1.0	268	53.5	0.0	25.0	520	278	0.00	0.00	27.14	0.00	0.0	7.40	2.29	28.13	80.0	2.0	304
MAX	60.0	456	105.1	6.0	90.0	890	503	0.25	0.34	62.50	0.05	3.7	8.50	7.36	71.40	230.0	59.0	741
MEAN	7.3	316	84.2	1.6	43.5	696	407	0.06	0.12	47.68	0.02	1.5	8.20	4.74	43.52	170.0	23.8	517
HISTORICAL 1978-2009 MIN	0.1	162	2.4	0.1	5.0	420	243	0.01	0.01	27.14	0.01	0.1	6.92	1.00	28.13	65.0	0.50	273
MAX	90.0	456	191.9	38.0	1112.0	4590	990	170.00	1.22	124.00	0.27	9.0	8.94	10.30	758.00	610.0	20540.00	2460
MEAN	6.3	316	80.7	3.6	96.6	1024	432	1.90	0.12	54.50	0.04	1.5	8.20	4.77	81.30	187.2	217.14	638
No. of Analysis	61	76	76	63	77	122	76	108	52	76	93	58	123	76	76	78	122	123

No samples taken in 1994 - No flow.

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 16: MEETINGHOUSE CANYON WATER QUALITY \*  
MHC01 - LEFT FORK

2001** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010627	240	40	8	4	517	211	0.30		27			8.56		9	31	29	257
20010913	236	34	5	3	438	200			28			8.71		11	28	7	265
2001** MIN	236	34	5	3	438	200	0.30		27			8.56		9	28	7	257
MAX	240	40	8	4	517	211	0.30		28			8.71		11	31	29	265
MEAN	238	37	7	3	478	206	0.30		28			8.64		10	30	18	261
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2000** MIN	241	34	5	3	395	199	0		26			8		7	20	50	212
MAX	262	37	5	3	398	204	1		29			8		11	24	66	239
MEAN	252	36	5	3	397	202	1		28			8		9	22	58	226
1999** MIN	240	38	10	2	399	211	0		24			9		6	19	21	223
MAX	246	45	10	4	431	214	0		29			9		7	26	21	231
MEAN	243	42	10	3	415	213	0		27			9		7	23	21	227
1998** MIN	204	37.0	13.0	1.0	429	208	0.50		19.00			7.03	1.00	6.00	34.0	40.0	247
MAX	257	52.0	34.0	5.0	557	238	0.60		30.00			8.55	1.00	11.00	44.0	95.0	290
MEAN	234	45.0	20.7	3.7	475	218	0.53		25.67			7.96	1.00	8.67	38.3	63.0	266.33
1997** MIN	240	36.0	5.0	5.0	424	197	0.50		23.00			8.46		6.0	18.0	9	240
MAX	254	43.0	10.0	8.0	435	202	0.50		26.00			8.52		8.0	31.0	36	280
MEAN	247	39.5	7.5	6.5	429.5	200	0.50		24.50			8.49		7.0	24.5	22.5	260
1996** MIN	219	42	7	5	421	225	0		23			9	1	7	13	10	229
MAX	236	52	20	11	423	233	1		31			9	1	9	26	31	245
MEAN	228	47	14	8	422	229	0		27			9	1	8	20	21	237
1995 MIN	230	46	10	4	399	220	0	0	21	0	5	9	1	9	14	10	190
MAX	240	53	15	5	402	234	0	0	29	0	5	9	1	9	28	15	200
MEAN	235	50	13	5	401	227	0	0	25	0	5	9	1	9	21	13	195
1994 MIN	No samples taken in 1994 - No flow.																
MAX																	
MEAN																	
1993 MIN	254	39.0	0.0	4.6	394	217	<0.05	0.10	18.90	<0.03	0.0	8.30	<0.10	4.80	14.0	9.0	219
MAX	256	65.8	<1.0	5.0	395	242	0.07	0.27	29.00	<0.03	0.1	8.80	<0.10	14.00	26.0	32.0	271
MEAN	255	52.4	0.5	4.8	395	229	0.06	0.18	23.90	<0.03	0.1	8.50	<0.10	9.40	20.0	20.5	245
1992 MIN	195	33.7	0.0	15.0	344	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183
MAX	195	33.7	0.0	15.0	344	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183
MEAN	195	33.7	0.0	15.0	344	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183
1991 MIN	232	66.6	<1.0	10.0	300	237	<0.02	<0.02	17.20	0.03	<0.1	8.30	<0.02	4.00	8.0	49.0	197
MAX	272	80.4	<1.0	25.0	300	316	0.10	0.21	28.00	0.08	2.0	8.40	0.28	6.70	18.0	175.0	238
MEAN	252	66.6	<1.0	17.5	300	277	0.06	0.11	22.60	0.06	1.1	8.40	0.15	5.40	13.0	112.0	218
HISTORICAL 1986-2000 MIN	195	2.2	0.1	1.0	300	175	0.02	0.01	17.20	0.01	0.1	7.03	0.01	3.80	8.0	0.10	183
MAX	49.0	80.4	34.0	47.5	557	350	1.20	0.30	36.50	0.10	10.9	8.81	1.62	14.00	100.0	175.00	304
MEAN	7.2	45.5	6.1	7.7	412	232	0.28	0.09	27.00	0.03	1.7	8.18	0.93	8.35	32.3	33.28	242
No. of Analysis	20	32	29	32	32	32	30	21	32	21	20	32	25	32	32	30	32

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 17: MILL FORK CANYON WATER QUALITY \*  
MEAL - ABOVE MINE

2001** SAMPLE DATES	ALKALINITY	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
NO FLOW DURING 2001																	
2000**																	
MIN																	
MAX																	
MEAN																	
No. of Analysis																	
2000**																	
MIN	275	53			451	219			21			8		4	15	13	247
MAX	275	53			451	219			21			8		4	15	13	247
MEAN	275	53			451	219			21			8		4	15	13	247
1998**																	
MIN	285	54.0		2.0	444	239			21.00			8.37	1.00	5.00	19.0	19.0	262
MAX	301	61.0		3.0	455	242			26.00			8.45	1.00	5.00	26.0	19.0	264
MEAN	293	57.5		2.5	449.5	240.5			23.50			8.41	1.00	5.00	22.5	19.0	263
HISTORICAL 1986-2000																	
MIN	153	32.0	6.5	2.0	180	208	0.06	0.48	13			8.00	1.00	1.00	12	1	176
MAX	400	82.0	8.0	24.0	813	462	3.03	0.50	73			8.45	3.00	24.00	223	342	710
MEAN	291	57.0	8.0	11.6	536	316	0.71	0.49	42.30			8.11	2.00	11.20	74.0	53.90	361
No. of Analysis	19	20	2	19	20	20	15	2	20			21	17	20	20	18	20

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.



TABLE 18: MILL FORK CANYON WATER QUALITY \*

## MFB2 - BELOW MINE

2001** SAMPLE DATES	ALKALINITY BICARBONATE	ACIDITY	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (umho)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010627	338		58	8	11.1	763	330			45			8.46	2	12	76	5	382
20010913	318		52	7	14.4	746	340			51			8.59	3	14	106		433
2001** MIN	318		52	7	11	746	330			45			8.46	2	12	76	5	382
MAX	338		58	8	14	763	340			51			8.59	3	14	106	5	433
MEAN	328		55	8	13	755	335			48			8.53	3	13	91	5	408
No. of Analysis																		
2000** 1999**	NO FLOW DURING 2000																	
MIN	286		54	7	2	481	241	0.40		24			8	1	5	22	64	274
MAX	328		57	7	9	608	312	0.40		43			8	2	7	59	64	355
MEAN	307		56	7	6	545	277	0.40		34			8	2	6	41	64	315
1998**																		
MIN	291		57.0	18.0	4.0	490	257	0.30		26.00			7.27	1.00	6.00	26.0	10.0	296
MAX	350		66.0	19.0	11.0	680	379	0.30		52.00			8.65	3.00	13.00	75.0	55.0	424
MEAN	333		60.0	18.5	7.8	605.5	322.75	0.30		42.00			8.20	2.00	10.25	58.5	27.0	371.5
HISTORICAL 1986-2000																		
MIN	186		1.0	7.0	2.0	240	227	0.05	0.10	14			7.27	0.70	5.00	16	1	204
MAX	412		76.0	19.0	17.0	725	416	0.97	10.00	81			8.90	5.20	14.00	103	64	504
MEAN	318		54.0	12.3	8.4	498	307	0.32	3.32	43.00			8.14	1.90	9.67	55.2	19.50	340
No. of Analysis	25		25	6	26	27	26	15	5	26			27	25	26	26	19	25

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 19: RILDA CANYON SURFACE WATER QUALITY \*  
RCF1 - RILDA CANYON FLUME - RIGHT FORK

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010605		261	58	6	2	508	223	0.10		19			8.55		5	15	17	242
20010913		244	46		2.2	468	205			22			8.62		9	26	273	
20011** MIN		244	46	6	2	468	205	0.10		19			8.55		5	15	17	242
MAX		261	58	6	2	508	223	0.10		22			8.62		9	26	17	273
MEAN		253	52	6	2	488	214	0.10		21			8.59		7	21	17	258
No. of Analysis	1	2	2	1	2	2	2	1	1	2	1	1	2	1	2	2	1	2
2000** MIN		252	53		2	420	223			22			8		6	20	13	266
MAX		252	53		2	420	223			22			8		6	20	13	266
MEAN		252	53		2	420	223			22			8		6	20	13	266
1999** MIN		245	57	6	1	437	241	0.40		24			8		6	14	43	243
MAX		269	63	9	2	449	256	0.40		24			9		23	24	43	257
MEAN		257	60	8	2	443	249	0.40		24			9		15	19	43	250
1998** MIN		237	55.0	15.0	3.0	447	227	0.10		21.00			8.25		5.00	17.0	18.0	254
MAX		247	62.0	26.0	3.0	464	241	0.70		22.00			8.56		7.00	23.0	96.0	292
MEAN		242	58.5	20.5	3.0	455.5	234	0.40		21.50			8.41		6.00	20.0	57.0	273
1997** MIN		266	52.0	5.0	3.0	420	204	1.10		18.00			8.39		5.0	18.0	6	230
MAX		275	56.0	7.0	4.0	465	222	1.10		20.00			8.47		7.0	25.0	56	290
MEAN		271	54.0	6.0	3.5	442.5	213	1.10		19.00			8.43		6.0	21.5	31	270
1996** MIN		240	53	12	4	423	235	1		21			9		5	1	96	245
MAX		245	68	14	11	451	256	1		25			9		9	1	96	272
MEAN		243	61	13	8	437	246	1		23			9		7	1	96	259
1995 MIN		245	60	10	4	384	270	2	0	21			8		6	15	120	220
MAX	10	260	83	20	5	423	290	3	1	30			9		24	47	240	270
MEAN	10	253	72	15	5	404	280	2	1	26			8		15	31	180	245
1994 MIN		239	48.0	1.0	1.0	378	202	0.20		20.00			8.73		8.00	19.0	4.0	230
MAX	10.0	239	48.0	1.0	1.0	378	202	0.20		20.00			8.73		8.00	19.0	4.0	230
MEAN	10.0	239	48.0	1.0	1.0	378	202	0.20		20.00			8.73		8.00	19.0	4.0	230
1993 MIN		254	54.0	0.0	2.5	399	238	0.05		19.20			8.69		4.90	17.0	0.0	225
MAX	0.0	290	63.6	1.0	5.0	915	250	0.12		28.00			8.99		12.00	23.0	41.0	266
MEAN	0.0	272	58.8	0.5	3.7	657	244	0.08		23.60			8.84		8.45	20.0	20.0	245
1992 MIN		262	63.9	0.1	15.0	371	255	0.07		23.10			8.90		6.30	17.0	8.0	222
MAX	0.1	262	63.9	0.1	15.0	371	255	0.07		23.10			8.90		6.30	17.0	8.0	222
MEAN	0.1	262	63.9	0.1	15.0	371	255	0.07		23.10			8.90		6.30	17.0	8.0	222
1991 MIN	<1.0	244	58.2	<1.0	15.0	300	225	<0.02		19.40			8.20		3.78	7.0	2.0	231
MAX	<1.0	329	108.6	<1.0	15.5	350	384	0.09		27.40			8.40		7.48	23.0	160.0	242
MEAN	<1.0	287	83.4	<1.0	15.3	325	305	0.06		23.40			8.30		5.63	15.0	81.0	237
HISTORICAL 1992-2000 MIN	0.1	227	48.0	0.1	1.0	300	201	0.02		18.00			7.78		3.78	1.0	2.0	220
MAX	10.0	329	108.6	26.0	15.0	482	384	2.50		30.00			8.88		24.00	80.0	240.0	292
MEAN	4.2	255	62.2	7.9	6.1	410	249	0.64		22.74			8.42		8.45	23.1	58.4	254
No. of Analysis	8	19	19	18	19	19	19	14	9	19		8	19	15	19	18	15	19

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 20: RILDA CANYON SURFACE WATER QUALITY \*  
RCE3 - RILDA CANYON FLUME - ABOVE NEWUA SPRINGS

2001**	SAMPLE	ACIDITY	ALKALINITY	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED	HARDNESS	IRON	IRON	MAGNESIUM	MANGANESE	OIL &	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010629	DATES	287	55	55	3	3	564		244	0	26	51			8.14	1	10	43	16	302
	20010913	423	88	88	9	9	908	11	430	0		55			8.19	3	22	145	569	
	20011213	431	92	92	8	8	904	9	456	1					7.97	3	23	159	5	550
2001**	MIN	287	55	55	3	3	564	9	244	0	26				7.97	1	10	43	5	302
	MAX	431	92	92	9	9	908	11	456	1	55				8.19	3	23	159	16	569
	MEAN	380	78	78	7	7	792	10	377	1	44				8.10	2	18	116	11	474
No. of	Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2000**	MIN	281	56	56	3	3	500	10	251	0	27				7.88	2	8	44	5	199
	MAX	418	87	87	8	8	882	11	431	0	52				8.17	3	24	140	14	570
	MEAN	367	76	76	6	6	740	10	370	0	44				8.07	3	18	106	8	436
1999**	MIN	276	60	60	7	2	448	6	245	0	23				8.05	2	6	19	5	264
	MAX	438	87	87	9	9	858	8	435	1	53				8.69	3	19	141	116	549
	MEAN	371	76	76	7	6	706	7	362	0	42				8.26	3	13	96	51	436
1998**	MIN	257	59.0	59.0	28.0	2.0	477	4.40	250	0.20	23.00				8.00	1.00	6.00	33.0	17.0	306
	MAX	380	79.0	79.0	28.0	6.0	692	6.60	370	1.40	42.00				8.32	2.00	15.00	74.0	244.0	413
	MEAN	316	66.7	66.7	28.0	4.0	563	5.67	294	0.60	31.00				8.20	1.33	10.00	49.7	130.5	342
1997**	MIN	273	59	59	8	4	468	6.30	246	0.30	24				8.13	2	6	24	16	290
	MAX	307	61	61	8	5	527	6.90	255	1.90	25				8.34	2	9	48	101	300
	MEAN	290	60	60	8	5	498	6.60	251	1.10	25				8.24	2	8	36	59	295
1996**	MIN	244	72	72	15	5	442	7	281	0	24				8	1	6	17	6	258
	MAX	406	82	82	18	14	747	13	397	2	47				9	2	13	91	136	461
	MEAN	343	75	75	17	9	647	10	351	1	40				8	2	11	63	71	379
1995	MIN	270	59	59	5	4	443	5	279	0	25				8	1	7	10	5	260
	MAX	415	90	90	20	8	710	7	400	3	47				8	3	15	76	250	470
	MEAN	335	77	77	11	6	564	6	347	1	38				8	2	11	47	79	350
1994	MIN	375	72.0	72.0	1.0	4.0	631	6.5	335	0.20	37.00				7.86	2.00	11.00	50.0	4.0	380
	MAX	401	73.0	73.0	1.0	6.0	719	7.9	370	0.20	47.00				8.37	5.00	13.00	60.0	6.0	436
	MEAN	388	72.5	72.5	1.0	5.0	675	7.2	352	0.20	42.00				8.12	3.50	12.00	55.0	5.0	408
1993	MIN	242	67.7	67.7	0.0	4.0	437	6.7	265	0.05	23.30				8.34	0.20	11.20	40.0	6.0	254
	MAX	412	75.0	75.0	1.0	5.0	674	7.7	381	0.08	47.00				8.83	2.00	16.00	70.0	39.0	469
	MEAN	327	71.3	71.3	0.5	4.5	555	7.2	323	0.06	35.15				8.59	1.10	13.60	55.0	22.5	361
1992	MIN	278	58.1	58.1	0.1	10.0	476	6.7	268	0.01	29.90				8.16	0.01	8.48	27.0	3.0	273
	MAX	453	97.6	97.6	0.1	20.0	722	9.0	444	0.28	48.60				8.47	1.60	17.55	110.0	18.0	430
	MEAN	375	80.1	80.1	0.1	13.3	634	7.9	370	0.10	41.37				8.33	0.92	13.86	72.3	8.7	377
1991	MIN	340	72.2	72.2	0.0	15.0	380	7.1	365	0.01	25.00				7.50	0.23	5.40	7.0	<1.0	241
	MAX	422	105.1	105.1	<1.0	50.0	620	10.0	453	0.14	49.80				8.30	4.57	14.50	140.0	185.0	487
	MEAN	382	91.7	91.7	0.8	31.3	525	8.1	401	0.06	41.80				7.90	1.65	11.40	74.3	48.5	389
HISTORICAL 1989-2000	MIN	242	56.0	56.0	0.1	2.0	380	4.4	246	0.02	23.30				7.50	0.01	5.40	7.0	1.0	199
	MAX	500	112.2	112.2	28.0	50.0	855	13.2	748	3.00	53.20				8.83	5.00	24.00	150.0	250.0	549
	MEAN	365	79.6	79.6	5.1	10.2	631	7.6	374	0.54	40.30				8.12	1.92	12.41	73.9	41.7	392
No. of	Analysis	24	39	39	26	39	40	40	39	35	39	21	23	23	40	36	39	39	33	39

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 21: RILDA CANYON SURFACE WATER QUALITY \*  
RCW4- RILDA CANYON FLUME--NEAR HIGHWAY 31

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	GREASE	OIL & PH (umho)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010314	8	422	83	4	4	4	8.20	470	0.20	0.20	64	4	4	8.23	3	27	190	603	603
20010629	311	311	62	4	4	4	10.90	307	0.20	0.20	37	37	386	8.32	2	15	97	17	386
20010913	379	379	75	4	4	4	11.80	422	0.20	0.20	57	57	574	8.47	3	25	168	70	574
20011213	426	426	85	4	4	4	11.80	476	0.20	0.20	64	64	583	8.32	3	25	173	60	583
2001** MIN	311	311	62.0	4	4	4	8.20	307	0.20	0.20	37.00	37.00	386	8.23	2.00	15.00	97.0	17.0	386
MAX	426	426	85.0	4	4	4	11.80	476	0.20	0.20	64.00	64.00	574	8.47	3.00	27.00	190.0	70.0	574
MEAN	385	385	76.3	4	4	4	10.30	419	0.20	0.20	55.50	55.50	536.5	8.34	2.75	23.00	156.8	17.0	536.5
No. of Analysis	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN	325	325	63.0	4	4	4	6.20	318	0.10	0.10	39.00	39.00	376	8.19	2.00	14.00	83.0	5.0	376
MAX	420	420	76.0	4	4	4	14.00	415	0.10	0.10	59.00	59.00	572	8.32	3.00	26.00	157.0	7.0	572
MEAN	382	382	69.3	4	4	4	10.50	387	0.10	0.10	52.00	52.00	492	8.24	2.50	22.25	130.0	6.0	492
1999** MIN	312	312	61.0	4	4	4	5.60	255	1.30	1.30	25.00	25.00	271	8.43	2.00	7.00	26.0	5.0	271
MAX	416	416	74.0	4	4	4	6.90	411	1.30	1.30	55.00	55.00	463	8.65	3.00	22.00	117.0	20.0	463
MEAN	368	368	68.0	4	4	4	6.43	347	1.30	1.30	43.00	43.00	393	8.51	2.50	14.67	84.0	12.5	393
1998** MIN	209	209	62.0	4	4	4	6.50	254	0.10	0.10	24.00	24.00	313	7.27	2.00	7.00	25.0	18.0	313
MAX	434	434	79.0	4	4	4	9.30	420	1.80	1.80	54.00	54.00	499	8.41	3.00	22.00	94.0	306.0	499
MEAN	330	330	67.3	4	4	4	7.68	341	0.95	0.95	42.00	42.00	415.5	8.01	2.67	15.50	70.3	162.0	415.5
1997** MIN	292	292	59	4	4	4	6.10	267	0.40	0.40	29	29	290	7.80	1	9	15	34	290
MAX	432	432	68	4	4	4	8.70	385	2.10	2.10	54	54	500	8.36	3	22	109	129	500
MEAN	376	376	64	4	4	4	7.50	333	1.25	1.25	42	42	415	8.20	2	16	58	82	415
1996** MIN	263	263	69	4	4	4	9	301	2	2	27	27	270	8	1	7	20	5	270
MAX	428	428	76	4	4	4	15	419	2	2	58	58	527	9	3	24	113	154	527
MEAN	369	369	73	4	4	4	11	385	2	2	50	50	451	8	2	19	83	80	451
1995 MIN	310	310	65	4	4	4	4	352	0	0	29	29	260	8	1	8	20	5	260
MAX	420	420	100	4	4	4	7	424	4	4	58	58	500	9	3	26	110	290	500
MEAN	355	355	80	4	4	4	6	384	1	1	45	45	420	8	2	19	75	80	420
1994 MIN	416	416	75.0	4	4	4	6.80	422	0.20	0.20	57.00	57.00	500	8.51	2.00	9.00	130.0	4.0	500
MAX	432	432	76.0	4	4	4	7.50	440	0.20	0.20	61.00	61.00	510	8.57	5.00	22.00	140.0	9.0	510
MEAN	424	424	75.5	4	4	4	7.1	431	0.20	0.20	59.00	59.00	505	8.54	3.50	20.50	135.0	6.5	505
1993 MIN	317	317	69.0	4	4	4	5.5	290	0.05	0.05	28.50	28.50	262	8.62	0.20	7.90	37.0	6.0	262
MAX	403	403	79.0	4	4	4	7.5	453	0.06	0.06	62.00	62.00	642	8.73	10.00	20.00	110.0	96.0	642
MEAN	360	360	74.0	4	4	4	6.5	371	0.05	0.05	45.25	45.25	452	8.67	5.10	13.90	73.5	56.0	452
1992 MIN	374	374	77.0	4	4	4	5.9	338	0.01	0.01	35.30	35.30	351	8.60	0.01	11.50	40.0	1.0	351
MAX	429	429	81.0	4	4	4	10.1	448	0.28	0.28	58.50	58.50	437	8.90	7.69	23.10	150.0	49.0	437
MEAN	400	400	79.9	4	4	4	8.2	383	0.10	0.14	44.60	44.60	380	8.80	2.57	15.90	90.0	17.7	380
1991 MIN	298	298	72.7	4	4	4	6.9	389	0.00	0.00	36.70	36.70	286	7.70	0.95	7.60	40.0	1.0	286
MAX	417	417	117.0	4	4	4	10.9	457	0.18	0.18	58.70	58.70	490	8.30	4.71	19.00	100.0	505.0	490
MEAN	373	373	89.5	4	4	4	8.5	433	0.06	0.61	51.00	51.00	424	8.00	2.64	15.40	80.0	131.0	424
HISTORICAL 1989-2000 MIN	209	209	59.0	4	4	4	3.9	254	0.01	0.01	24.00	24.00	260	7.27	0.01	7.00	15.0	1.0	260
MAX	461	461	132.7	4	4	4	15.1	545	3.80	3.80	67.20	67.20	642	8.86	10.00	52.00	250.0	505.0	642
MEAN	374	374	76.5	4	4	4	7.8	389	0.62	0.09	48.00	48.00	436	8.28	2.57	18.50	97.2	59.9	436
No. of Analysis	22	40	40	29	40	41	41	40	27	19	40	40	22	41	38	40	40	32	40

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 22: COTTONWOOD CANYON CREEK WATER QUALITY \*  
SW-1

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010309		422	71		17	947	412			57			8.05	2	27	126	14	473
20010606		312	57		7	660	270			31			8.24	1	14	44		299
20010920		376	65		14.5	859	360			48			8.4	2	22	87.7	6	454
2001** MIN		312.0	57.0		7.0	660.0	270.0	0.0		31.0			8.1	1.0	14.0	44.0	6.0	299.0
MAX		422.0	71.0		17.0	947.0	412.0	0.0		57.0			8.4	2.0	27.0	126.0	14.0	473.0
MEAN		370.0	64.3		12.8	822.0	347.3	#DIV/0!		45.3			8.2	1.7	21.0	85.9	10.0	408.7
No. of Analysis	4	3	3	4	3	3	3	0	4	3	4	4	3	3	3	3	2	3
2000** MIN		289	43		8	521	239	0		32			8	3	12	38	25	304
MAX		299	49		9	531	262	0		34			8	3	13	43	29	319
MEAN		294	46		9	526	251	0		33			8	3	13	41	27	312
1999** MIN		286	51		4	495	247	0		28			8	1	6	24	10	271
MAX		347	66		11	629	313	1		36			8	2	14	59	159	376
MEAN		324	59		8	544	283	0		31			8	1	10	37	61	309
1998** MIN		282	55.0	14.0	6.0	500	259	0.10		27.00		6.0	7.74	1.00	8.00	33.0	12.0	310
MAX		324	64.0	14.0	9.0	562	300	1.00		34.00		6.0	8.38	2.00	12.00	62.0	130.0	330
MEAN		310	59.3	14.0	7.7	528	274.67	0.63		30.67		6.0	8.14	1.33	10.00	44.0	70.3	318
1997** MIN		304	54	5	8	528	246	0		27			8	1	9	32	6	300
MAX		346	58	5	22	595	281	1		33			8	2	11	50	78	300
MEAN		317	55	5	16	546	257	1		29			8	2	10	42	43	300
1996** MIN	14	288	63	12	9	537	293	0		33			8	1	12	29	36	308
MAX	27	413	77	12	18	822	425	1		56			8	2	23	108	36	518
MEAN	21	376	70	12	15	729	377	0		49			8	2	20	78	36	446
1995 MIN	10	290	6	15	8	502	300	0	0	28	0	5	8	1	11	25	5	280
MAX	10	395	81	20	27	961	520	2	0	78	0	5	8	3	38	170	105	690
MEAN	10	352	54	18	17	721	405	1	0	52	0	5	8	2	24	95	48	467
HISTORICAL 1977-2000 MIN	1.0	231	6.0	1.0	0.7	380.0	210.0	0.02	0.1	2.4	0.0	0.5	7.1	1.0	6.0	20.0	0.5	226.0
MAX	27.0	433	152.3	20.0	27.0	961.0	520.0	15.9	0.4	78.0	1.3	358.0	8.7	21.0	60.0	238.7	1298.0	690.0
MEAN	5.8	336	65.7	5.6	12.4	644.1	326.0	0.9	0.1	38.0	0.1	11.1	7.9	3.0	20.0	70.9	71.9	372.2
No. of Analysis	44	78	77	19	78	39	45	73	18	78	54	41	73	74	77	78	71	78

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 23: COTTONWOOD CANYON CREEK WATER QUALITY \*  
SW-2

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010309		521	51	8	84	1096	312	10.6		45	0.3		8.5	4	173	116	788	636
20010606		305	53	7	8	709	285	0.3		37			7.14	1	17	44	16	319
20010920		349	76		29.7	1236	490			73			8.53	8	47	251.7		724
20011213		378	81		24.9	1031	495			71			8.34	6	43	250.7	7	663
2001** MIN		305	51	7	8	709	285	0.30		37			7	1	17	44	7	319
MAX		521	81	8	84	1236	495	10.60		73			9	8	173	252	788	724
MEAN		388	65	8	37	1018	396	5.45		57			8	5	70	166	270	586
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN		288	19	5	13	563	113	0		16			8	1	25	57	6	335
MAX		627	46	20	92	1251	271	1		38			9	5	268	103	29	786
MEAN		489	32	12	39	1037	192	0		28			8	4	172	87	14	642
1999** MIN		332	33	11	6	521	181	0		24			8	2	11	31	6	298
MAX		642	58	14	72	1237	300	1		39			9	5	231	115	89	784
MEAN		445	47	13	28	860	249	0		32			8	3	100	76	33	511
1998** MIN		356	28.0	7.0	4.0	587	185	0.40	0.20	26.00		5.0	8.18	1.00	29.00	25.0	11.0	353
MAX		635	53.0	7.0	68.0	1330	257	1.00	0.30	34.00		5.0	8.53	5.00	230.00	146.0	107.0	834
MEAN		496	43.8	7.0	33.3	980.75	232.5	0.68	0.25	30.00		5.0	8.38	3.25	140.25	87.3	52.0	617
1997** MIN		308	29	85	10	531	151	1	0	19			8	1	11	35	10	310
MAX		606	69	85	179	1344	460	1	0	65			9	4	221	145	148	840
MEAN		440	49	85	71	1013	285	1	0	38			9	3	118	107	79	637
1995 MIN	10	290	63	10	8	515	300	0	0	30		5	8	1	12	32	5	350
MAX	10	440	74	35	40	955	490	1	0	73		10	9	4	46	190	85	700
MEAN	10	344	71	24	26	749	415	1	0	58		6	9	3	31	116	36	550
HISTORICAL 1977-2000 MIN	0.10	233	11.1	1.0	1.5	410	151	0.05	0.05	2.40	0.01	0.1	7.00	1.00	8	19.5	1.0	267
MAX	25.00	642	136.9	85.0	179.0	1709	631	16.20	1.25	109.00	1.37	39.0	8.93	25.60	268	254.0	1004.0	1170
MEAN	5.24	359.25	62.14	13.37	22.68	863	323	1.06	0.18	40.17	0.10	3.23	8.09	4.44	49.25	94.49	69.5	452
No. of Analysis	42	79	79	27	79	40	46	76	22	79	57	51	74	78	78	79	76	79

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 24: COTTONWOOD CANYON CREEK WATER QUALITY \*  
SW-3

2001** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH(units)	POTASSIUM	SODIUM	SULFATE	TSS	IDS
20010309	401	37	11	64	1291	224	0.2		32			8.53	5	169	183		695
20010418	373	34	32	45	1174	221	0.2		33			8.57	5	170	188	11	645
20010606	307	55		47	951	335			48			8.32	2	40	104		440
20010920	451	117		237.4	2300	745			110			8.33	5	153	381.7		1299
2001** MIN	307	34	11	45	951	221	0.20		32			8.32	2.00	40	104	11	440
MAX	451	117	32	237	2300	745	0.20		110			8.57	5.00	170	382	11	1299
MEAN	383	61	22	98	1429	381	0.20		56			8.44	4.25	133	214	11	770
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN	485	15	18	31	1230	99	0		15			9	4	233	112	12	774
MAX	602	32	48	607	2800	216	0		33			9	5	531	147	18	1563
MEAN	552	23	30	181	1652	159	0		25			9	5	325	130	15	988
1999** MIN	384	24	8	14	703	171	0		27			9	2	82	64	10	420
MAX	565	41	70	76	1277	232	1		37			9	5	249	144	123	782
MEAN	460	30	28	38	1064	201	1		31			9	4	168	111	53	640
1998** MIN	308	20.0	18.0	10.0	592	165	0.40	0.20	27.00			8.06	2.00	33.00	35.0	8.0	340
MAX	633	48.0	37.0	61.0	1361	231	2.30	0.20	31.00			8.72	6.00	267.00	181.0	224.0	876
MEAN	484	31.8	26.0	36.3	1006.25	198.5	1.10	0.20	29.00			8.52	4.00	178.25	111.8	99.3	664.5
1997** MIN	350	32	10	22	795	181	1		24		28	8	2	67	121	11	490
MAX	569	115	18	95	1595	687	1		97		28	9	4	220	438	114	1130
MEAN	479	57	14	48	1224	329	1		46		28	8	4	153	228	78	798
1996** MIN	265	55	20	20	651	327	1		46		3	8	2	25	100	38	400
MAX	452	111	20	78	1491	652	1		95		3	9	4	100	398	38	1052
MEAN	385	91	20	56	1237	563	1		82		3	8	3	78	267	38	852
1995 MIN	290	71	5	7	506	310	0	0	32		5	8	1	12	30	5	380
MAX	420	102	30	56	1184	654	1	0	97		5	9	4	90	355	95	960
MEAN	365	90	17	39	956	536	1	0	75		5	8	3	64	241	35	763
HISTORICAL 1977-2000 MIN	253	14.3	0.1	1.7	506	99	0.04	0.05	2.40		0.2	7.20	1.00	3	22	1.0	40
MAX	633	159.0	70.0	607.0	2800	687	19.00	0.43	97.00		114.0	9.00	30.00	531	438	5024.0	1563
MEAN	372	69.1	12.9	36.2	1165	391	1.18	0.14	46.58		4.8	8.12	4.30	74.00	155.3	143.6	575
No. of Analysis	44	82	32	82	44	50	74	22	83	53	59	78	81	82	83	73	83

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 25: GRIMES WASH WATER QUALITY \*

## GWR01 - RIGHT FORK

2001 **SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	GREASE PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
2001**	NO SAMPLES COLLECTED DURING 2001 - NO FLOW																	
2000**	NO SAMPLES COLLECTED DURING 2000 - NO FLOW																	
1999**	NO SAMPLES COLLECTED DURING 1999 - NO FLOW																	
1998**	NO SAMPLES COLLECTED DURING 1998 - NO FLOW																	
1997**	NO SAMPLES COLLECTED DURING 1997 - NO FLOW																	
MIN		240	57		5	419	9	237	2.60		23		8.39	2	6	55		280
MAX		240	57		5	419	9	237	2.60		23		8.39	2	6	55		280
MEAN		240	57		5	419	9	237	2.60		23		8.39	2	6	55		280
No. of	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
No flow during 1989 - 96																		
1988																		
MIN	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	5.20	1.90	27.0	8.0	196
MAX	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	5.20	1.90	27.0	8.0	196
MEAN	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	5.20	1.90	27.0	8.0	196
1987																		
MIN	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	--	7.20	2.00	20.0	2000.0	115
MAX	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	--	7.20	2.00	20.0	2000.0	115
MEAN	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	--	7.20	2.00	20.0	2000.0	115
1986																		
MIN	<1.0	240	30.0	<1.0	8.3	465	7.6	222	<0.05	<0.05	35.70	<0.01	<0.5	1.60	3.40	40.0	0.5	262
MAX	<1.0	320	52.0	<1.0	11.5	680	9.8	320	<0.05	0.73	46.20	0.05	2.2	3.30	20.40	120.0	257.0	389
MEAN	<1.0	275	41.6	<1.0	10.2	547.6	8.8	268	<0.05	0.24	39.90	0.02	0.7	2.50	15.70	61.3	60.6	316
HISTORICAL 1979-2000																		
MIN	0.1	104	30.0	1.0	3.0	190	6.8	112	0.01	0.05	6.30	0.01	0.5	1.60	1.85	20.0	0.5	115
MAX	39.0	320	57.0	1.0	26.4	750	9.8	320	20.60	3.31	46.20	0.30	9.0	7.64	20.44	161.7	7116.0	700
MEAN	5.5	238	42.6	1.0	10.8	557	8.6	238	1.38	0.47	31.96	0.06	1.8	3.21	13.20	63.7	370.2	338
No. of Analysis	11	10	10	9	12	43	10	10	47	9	9	42	12	10	10	14	47	47

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.



TABLE 26: GRIMES WASH WATER QUALITY \*

## GWR02 - LEFT FORK

2001** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010606	370	72		8	917	361	0.1		44			8.4	1	35	122	10	460
20010920	329	44	7	9.8	806	303			47			8.66	1	42	109.2		451
2001** MIN	329	44	7	8	806	303	0.10		44			8.40	1	35	109.2	10	451
MAX	370	72	7	10	917	361	0.10		47			8.66	1	42	122	10	460
MEAN	350	58	7	9	861.5	332	0.10		45.5			8.53	1	38.5	115.6	10	455.5
No. of	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2000** MIN	296	40		10	691	302			49			8	2	42	136	17	423
MAX	296	40		10	691	302			49			8	2	42	136	17	423
MEAN	296	40		10	691	302			49			8	2	42	136	17	423
1999** MIN	293	35		7	618	252			40			8	1	31	86	8	367
MAX	436	79		9	836	424			55			9	1	37	124	8	523
MEAN	365	57		8	727	338			48			8	1	34	105	8	445
1998** MIN	249	32.0		9.0	585	232			37.00			7.92	1.00	30.00	83.0	32.0	372
MAX	368	61.0		10.0	721	321			41.00			8.70	2.00	38.00	83.0	53.0	451
MEAN	309	46.5		9.5	653	276.5			39.00			8.31	1.50	34.00	83.0	42.5	411.5
1997** MIN	280	47		10	637	286			41			8	1	28	98		380
MAX	355	73		15	845	376			47			9	2	29	212		540
MEAN	318	60		13	741	331			44			8	2	29	155		460
No flow during 1994 - 1996																	
1993 MIN	276	88.9	0.0	8.9	470	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366
MAX	276	88.9	0.0	8.9	470	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366
MEAN	276	88.9	0.0	8.9	470	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366
No flow during 1989 - 92																	
1988 MIN	312	71.5	<1.0	10.0	600	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428
MAX	312	71.5	<1.0	10.0	600	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428
MEAN	312	71.5	<1.0	10.0	600	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428
1987 MIN	188	2.3	<1.0	6.0	412	337	<0.05	<0.05	23.80	<0.01	<0.5	7.60	1.00	11.10	45.0	<1.0	212
MAX	482	71.1	15.0	156.0	610	460	0.12	0.62	68.50	0.06	3.5	8.60	2.50	34.00	9.0	48.0	382
MEAN	317	38.1	3.8	56.6	526	296	0.07	0.17	43.40	0.02	1.7	7.80	1.40	28.50	73.6	14.6	307
1986 MIN	281	36.0	<1.0	7.7	410	252	<0.05	<0.05	37.70	<0.01	<0.5	7.40	1.30	25.20	67.0	3.0	293
MAX	331	58.0	<1.0	10.9	690	310	<0.05	0.22	43.80	0.07	0.6	8.00	3.00	34.00	115.0	253.0	427
MEAN	304	45.5	<1.0	8.8	591	278	<0.05	0.12	39.90	0.02	0.5	7.70	1.90	29.20	77.9	54.1	346
HISTORICAL 1979-2000 MIN	188	2.3	1.0	6.0	410	196	0.02	0.02	23.80	0.01	0.1	7.30	1.00	11.10	30.4	0.5	212
MAX	482	88.9	26.0	156.0	845	460	2.52	0.22	68.50	0.15	3.5	8.85	3.00	42.00	212.0	1428.0	570
MEAN	313	49.1	4.5	16.1	634.2	299	0.21	0.08	41.51	0.03	1.0	8.04	1.56	29.44	87.3	54.6	371.6
No. of																	
Analysis	16	22	17	22	57	22	56	7	22	51	15	59	22	22	23	57	59

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 27: GRIMES WASH WATER QUALITY \*  
GWR03 - RIGHT FORK

2001** SAMPLE DATES	ALKALINITY ACIDITY	BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unadj)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010309		346	122		651	3640	667	0.8		88			8.23	6	429	406	37	1985
20010606		370	80		1169		418			53			8.41	2	59	172	6	801
20010926		349	88		1595		562			83			8.43	4	123	314.6		985
20011213		423	143		2200		843			118			7.87	6	184	550.5		1516
2001** MIN		346	80		1169		418	0.80		53			7.87	2	59	172	6	601
MAX		423	143		3640		843	0.80		118			8.43	6	429	551	37	1985
MEAN		372	108		2151		623	0.80		86			8.24	5	194	361	22	1272
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2000** MIN		298	105		1895		563	0.50		73			8.15	5	150	392	10	1347
MAX		323	132		9960		696	1.00		101			8.22	6	1870	464	70	5862
MEAN		311	116		4136		650	0.75		88			8.20	5	630	432	43	2568
1999** MIN		305	97		1283		542	0.20		73			8.18	5	64	321	7	893
MAX		364	120		1832		703	2.20		98			8.45	6	169	399	34	1225
MEAN		337	107		1612		598	1.20		81			8.29	5	118	362	21	1088
1998** MIN		350	91.0		1216		495	0.20		65.00			8.12	4.00	58.00	249.0	14.0	812
MAX		372	136.0		2440		731	1.40		95.00			8.55	7.00	262.00	484.0	49.0	1629
MEAN		361	113.3		1707.75		619.5	0.67		81.75			8.29	5.75	132.00	385.5	31.0	1161
1997** MIN		335	86		1362		487	0		66			8	3	83	165	7	910
MAX		374	133		3040		699	0		89			8	6	443	403	13	1910
MEAN		359	108		1900		591	0		78			8	5	182	285	10	1243
1996** MIN	13	317	113		1184		599	0.06		75			8	6	49	304	6	821
MAX	17	343	125		3070		775	0.40		113			8	7	447	442	11	1808
MEAN	15	335	119		1831		663	0.19		89			8	7	175	346	9	1195
1995 MIN	10	315	86		970		440	0.10	0.10	55		5	8	6	44	180	5	650
MAX	10	375	107		1128		572	0.60	0.10	74		5	9	8	82	264	10	930
MEAN	10	339	94		1072		499	0.28	0.10	65		5	8	7	72	224	8	798
1994 MIN	10.0	325	86.0	1.0	941		430	0.10	0.20	53.00		5.0	8.06	8.00	37.00	180.0	4.0	579
MAX	10.0	398	108.0	5.0	1560		607	0.20	1.90	82.00		5.0	8.81	9.00	114.00	310.0	40.0	980
MEAN	10.0	358	96.2	2.7	1199		498	0.18	0.90	63.00		5.0	8.42	8.25	73.00	227.5	16.0	754
1993 MIN	0.0	249	95.8	0.0	590		364	0.05	0.23	30.40		0.0	7.76	2.10	27.10	120.0	2.0	444
MAX	10.0	362	163.0	1.0	3280		736	0.22	5.10	93.00		5.0	8.61	10.00	60.00	370.0	280.0	2109
MEAN	2.5	320	127.0	0.3	1640		578	0.16	1.90	63.35		1.6	8.28	6.40	42.60	247.0	78.5	1079
1992 MIN	0.1	214	96.0	0.1	1230		488	0.01	0.07	60.20		0.1	8.20	3.41	60.80	340.0	8.0	955
MAX	50.0	369	190.8	0.1	2190		766	0.30	0.34	74.00		1.1	8.70	10.70	283.70	450.0	58.0	1393
MEAN	12.4	313	154.2	0.1	1754		665	0.11	0.22	67.86		0.8	8.42	7.14	207.80	400.0	22.2	1201
1991 MIN	<1.0	295	71.4	0.0	710		385	<0.02	0.09	26.90		0.6	7.60	<0.01	25.70	200.0	3.0	565
MAX	22.0	338	205.6	<1.0	3000		849	0.85	0.86	81.60		2.3	8.20	12.80	460.50	420.0	247.0	2080
MEAN	7.0	313	151.7	0.8	1510		629	0.20	0.35	60.70		1.4	7.90	4.67	148.30	312.0	64.0	1131
HISTORICAL 1979-2000 MIN	0.1	117	5.1	0.1	220		146	0.01	0.01	10.70		0.1	7.10	0.01	9.00	46.0	0.5	152
MAX	127.0	486	274.0	15.0	12000		1165	22.60	2.26	116.80		27.0	8.81	12.80	3181.00	600.0	9702.0	7160
MEAN	12.26	341	124.9	2.0	1612.7		624.19	0.84	0.18	75.06		2.9	8.04	5.84	213.49	328.0	175.5	1015
No. of Analysis	57	70	70	48	72	110	70	105	51	70	89	53	114	69	70	73	104	112

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**Table 28**  
**EAST MOUNTAIN SPRINGS DISCHARGE**  
2001

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
Sheba	07/25/2001	2.9	6.0	10/09/2001	1.0	5.1	-65.52
Elk Spring	07/25/2001	131.0	4.0	10/08/2001	67.0	3.5	-48.85
Burnt Tree	07/26/2001	5.6	5.4	10/04/2001	6.0	5.6	7.14
Jerk Water							
Pine Springs							
Pine Sp. Trough							
Ted's Tub	07/26/2001	24.0	5.7	10/09/2001	6.6	3.3	-72.50
79-1							
79-2	07/26/2001	1.9	4.6	10/04/2001	1.2	4.8	-36.84
79-3							
79-4							
79-5							
79-6							
79-7							
79-8							
79-9							
79-10	07/25/2001	10.3	5.2	10/09/2001	3.2	3.3	-68.93
79-11							
79-12	07/27/200	0.5	est., sheet flow	10/09/2001		damp	
79-13							
79-14							
79-15	07/26/2001	10.5	5.0	10/10/2001	3.9	2.9	-62.86
79-16							
79-17							
79-18							
79-19							
79-20							
79-21							
79-22							
79-23	07/26/2001		dry	10/04/2001	dry		
79-24	07/26/2001		dry	10/04/2001	dry		
79-25							
79-26	07/25/2001	4.3	7.7	10/08/2001	1.6	5.5	-62.79
79-27							
79-28	07/25/2001	1.2	5.9	10/09/2001	0.4	4.8	-65.83
79-29	07/25/2001	1.5	4.4	10/08/2001	1.0	3.4	-33.33
79-30							
79-31							
79-32	07/25/2001	0.6	10.4	10/08/2001	0.4	5.8	-35.48
79-33							
79-34	07/26/2001	8.4	4.8	10/09/2001	0.3	4.4	
79-35	07/25/2001	4.5	4.6	10/08/2001	1.6	5.5	-64.44
79-36							
79-37							
79-38	07/27/2001	3.3	5.1	10/09/2001	1.4	4.8	-57.58
79-39							
79-40	07/26/2001	1.3	4.5	10/09/2001		dry	
80-41	07/26/2001	4.8	3.1	10/09/2001	0.5	3.0	-90.00

**Table 28**  
**EAST MOUNTAIN SPRINGS DISCHARGE**  
**2001**

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
80-42							
80-43	07/26/2001		DAMP	10/04/2001		dry	
80-44	07/26/2001	0.5	est., sheet flow	10/09/2001	0.5	est., sheet flow	
80-45							
80-46	07/26/2001	2.1	4.6	10/04/2001		damp	
80-47	07/26/2001	9.4	4.0	10/04/2001	6.8	4.5	-27.66
80-48	07/25/2001	3.8	6.4	10/08/2001	1.6	6.9	-57.89
80-49							
80-50	07/30/2001	0.8	7.4	10/11/2001	0.4	6.3	-52.50
82-51	07/26/2001	1.3	8.7	10/04/2001	0.1		-92.31
82-52	07/26/2001	8.0	4.1	10/04/2001	4.1	4.3	-48.75
84-53							
84-54							
84-55							
84-56	07/26/2001	0.8	5.5	10/09/2001	0.4	3.6	-48.68
85-57							
86-58							
86-59							
89-60	07/27/2001	7.6	7.6	10/09/2001	1.0	3.2	-86.84
89-61	07/25/2001	47.0	4.1	10/08/2001	20.0	3.7	-57.45
89-62							
89-63							
89-64							
89-65	07/25/2001	1.2	6.0	10/08/2001	0.7	6.3	-45.00
89-66	07/25/2001	1.0	6.4	10/08/2001	<0.05		
89-67	07/25/2001	4.9	4.1	10/08/2001	2.8	4.3	-42.86
89-68	07/25/2001	1.0	8.3	10/08/2001	0.5	8.1	-51.00
89-69							
89-70							
89-71							
91-72	07/27/2001	8.2	8.5	10/10/2001	8.3	8.5	1.22
91-73	07/27/2001	0.9	8.8	10/10/2001	0.51	6.7	-44.57

TOTAL FLOW FOR JULY  
(W/OUT 80-50, 91-72 & 73)

305.2

134.9

Net Change - Average

-52.30

Net Change - By Volume

-55.79

TOTAL FOR JULY 2000 = 205.4 GPM

JULY 2001 48 % HIGHER THAN JULY 2000

Table 29: East Mountain Yearly Spring Discharge Variations (GPM)

July Flow Data

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Spring																			
Burnt Tree	30.5	26.6	26.1	17.5	10.2	12.0	6.4	4.1	2.0	4.0	8.6	7.5	7.5	5.5	8.5	6.8	5.0	3.3	5.6
Elk Spring	642.3	427.9	390.5	309.7	217.0	217.4	78.5	130.8	176.0	116.8	369.9	46.2	599.3	309.0	235.0	413.0	309.0	107.0	131.0
Sheba	22.9	19.7	14.4	8.6	11.4	10.4	1.1	8.1	10.1	6.3	11.0	0.9	10.6	14.9	4.8	7.2	6.1	2.6	2.9
Ted's Tub	89.0	48.0	39.1	31.6	69.0	60.0	5.0	13.0	21.0	13.6	51.0	6.0	76.2	36.7	42.9	83.2	30.0	20.0	24.0
79-2	9.1	9.7	5.5	2.9	4.0	2.1	2.7	3.9	2.4	2.3	7.5	1.7	2.6	2.0	2.1	2.1	2.2	1.9	1.9
79-10	37.1	20.0	33.3	26.1	26.1	25.0	7.0	10.2	12.5	10.5	30.0	4.0	30.0	17.6	14.0	24.0	20.0	5.2	10.3
79-15	42.9	26.1	18.2	18.2	14.6	12.7	2.9	3.0	5.0	4.1	20.7	2.0	33.3	11.0	13.6	18.3	15.0	6.3	10.5
79-23	20.0	3.6	6.8	0.6	damp	damp	dry	dry	damp	dry	damp	dry	no flow	dry	dry	0.2	dry	dry	dry
79-24	9.3	6.1	5.0	4.3	damp	0.8	dry	dry	dry	damp	damp	dry	0.1	dry	dry	1.0	dry	dry	dry
79-26	20.7	20.0	10.9	8.7	1.5	3.3	0.3	dry	damp	damp	10.0	dry	10.0	0.8	5.0	7.9	2.7	1.4	4.3
79-29	10.0	6.2	6.0	4.7	2.5	2.6	1.1	1.3	1.7	0.8	2.9	0.7	3.1	1.2	1.0	3.0	1.7	1.3	1.5
79-32	3.3	3.1	2.7	1.3	1.0	0.6	0.5	damp	no flow	no flow	1.3	damp	1.0	0.6	1.0	2.2	1.0	0.4	0.6
79-34	56.7	42.9	18.5	16.7	10.5	13.3	dry	dry	0.3	damp	13.0	dry	30.0	7.5	5.5	13.2	8.6	0.4	8.4
79-35	15.0	10.5	10.5	7.8	6.3	2.7	dry	1.9	4.3	4.4	8.9	0.5	3.0	4.5	8.6	4.6	5.0	2.7	4.5
79-38	10.9	9.2	4.7	3.6	8.3	10.0	1.1	7.8	6.5	2.3	6.4	0.5	10.0	7.5	4.0	7.5	5.0	4.0	3.3
79-40	15.0	8.3	5.6	4.7	2.0	5.4	dry	dry	dry	dry	4.0	dry	2.0	0.5	1.4	2.0	1.7	dry	1.3
80-41	10.9	15.0	5.8	4.1	2.5	3.9	dry	dry	dry	dry	4.0	dry	2.4	0.5	4.5	5.4	3.7	1.3	4.8
80-43	24.0	20.0	6.6	3.1	0.4	1.8	dry	dry	dry	dry	2.7	dry	1.5	damp	damp	0.5	0.1	dry	dry
80-44	24.0	13.1	5.5	2.2	dry	0.5	dry	dry	dry	dry	1.4	dry	3.0	damp	0.2	0.5	0.1	0.5	0.5
80-46	60.0	28.3	18.2	12.0	4.0	6.7	dry	dry	dry	dry	7.5	dry	5.0	damp	4.0	4.6	2.5	damp	2.1
80-47	20.0	15.0	12.5	12.2	7.4	9.9	4.6	2.0	1.3	3.3	13.3	2.2	12.6	5.0	9.2	10.5	8.6	5.0	9.4
82-51	10.0	5.9	3.8	2.6	damp	damp	dry	dry	0.1	damp	3.2	damp	3.0	0.5	2.0	2.1	0.7	0.1	1.3
82-52	80.0	48.0	32.1	23.3	20.1	21.5	2.6	1.3	1.0	1.0	16.7	2.0	15.0	7.0	12.0	12.0	12.0	3.4	8.0
84-56	9.6	6.3	4.7	3.7	2.5	2.9	1.6	1.0	0.5	0.6	1.0	0.3	1.0	0.3	0.7	1.7	0.9	0.2	0.8
Totals	1254.3	839.5	687.0	530.2	421.3	425.5	115.4	188.4	244.7	170.0	595.0	74.5	862.2	432.6	379.9	633.5	441.6	167.0	237.0

xx No measurement - utilized yearly comparison.

Table 30

Mode of Occurrence – East Mountain Springs  
Occurrences

Stratigraphic Location	Permeable fluvial channels that intersect the land surface	Flow along permeable strata underlain by impermeable mudstone which intersects the land surface	Contact of permeable beds and the Roans Canyon Fault zone	Mode of Occurrence not identified
Base of Flagstaff		79-6, 79-7, 79-35, 86-58, 89-69	<u>Sheba Springs, 79-1</u>	
North Horn Formation	<u>Ted's Tub, Burnt Tree</u> 79-2, 79-3, 79-8, 79-9, 79-11, 79-12, 79-13, 79-14, 79-15, 79-16, 79-17, 79-21, 79-22, 79-26, 79-27, 79-28, 79-29, 79-34, 79-39, 80-42, 80-43, 80-46, 80-47, 80-48, 80-53, 84-56, 86-59, 89-62, 89-63, 89-64, 89-65, 89-66, 89-67, 89-68, 89-71		<u>Elk Springs, 79-10, 79-18, 79-19, 79-20, 84-54, 89-61, 89-70</u>	
Base of North Horn Formation		79-23, 79-25, 79-32, 79-36, 79-37, 79-38, 84-55	79-30, 79-31	
Other Stratigraphic Horizons	<u>Blackhawk Formation</u> 80-50, 84-57, 91-73 <u>Price River Formation</u> Bear Canyon Fault Zone 82-51		<u>Price River</u> 80-49, <u>Blackhawk</u> 91-72	<u>Flagstaff Limestone</u> 79-4, 79-5, Pine Springs Trough <u>Price River Formation</u> 79-24, 79-33, 79-40, 80-41, 80-44, 80-45, 82-52, Jerk Water, 89-60 ( <u>Alpine</u> )



TABLE 31: TEMPERATURE COMPARISON

	EAST MOUNTAIN DEPARTURE FROM NORMAL	ELECTRIC LAKE DEPARTURE FROM NORMAL	HUNTER PLANT DEPARTURE FROM NORMAL	HUNTINGTON PLANT DEPARTURE FROM NORMAL	
1989					
JAN	-2.1	-4.1	-7.8	-4.8	
FEB	-3.5	-6.6	-1.4	-5.7	
MAR	5.7	8.1	9.5	3.8	
APR	6.0	6.9	9.5	5.7	
MAY	4.4	4.0	6.8	0.7	
JUN	-4.5	-6.4	5.0	-1.8	
1990					
JAN	-2.4	-0.8	3.7	0.9	
FEB	-1.1	-4.9	5.2	-2.0	
MAR	1.9	7.0	8.7	2.6	
APR	2.1	6.3	10.9	4.6	
MAY	0.8	3.0	6.8	-1.3	
JUN	3.3	4.8	10.9	1.0	
1991					
JAN	-1.9	-2.2	-4.5	-4.4	
FEB	5.8	0.6	7.5	3.7	
MAR	-13.3	-2.5	2.8	-5.8	
APR	-5.5	-3.0	1.9	-3.3	
MAY	-0.7	-1.8	5.1	-5.1	
JUN	-1.2	-0.6	7.7	-2.8	
1992					
JAN	-0.4	0.8	-6.2	-1.6	
FEB	0.8	7.8	5.5	0.9	
MAR	2.2	8.0	8.5	2.9	
APR	4.9	11.8	12.6	8.6	
MAY	4.5	7.0	11.8	3.3	
JUN	-0.5	3.6	7.6	-3.3	
1993					
JAN	-3.8	2.7	0.9	-0.8	
FEB	-3.5	-2.9	0.5	-4.3	
MAR	4.2	-3.6	7.2	-0.5	
APR	-2.2	0.1	4.4	-2.0	
MAY	4.1	2.8	8.9	1.6	
JUN	-3.9	-2.2	5.8	-4.1	
1994					
JAN	0.8	2.3	-1.2	6.3	
FEB	-3.5	3.2	1.6	-3.5	
MAR	6.1	6.6	10.1	5.0	
APR	0.0	6.0	4.7	0.2	
MAY	4.6	7.2	8.9	2.7	
JUN	9.1	4.8	13.4	5.4	
1995					
JAN	1.4	1.6	3.9	1.5	
FEB	10.3	5.2	11.8	7.4	
MAR	3.1	2.4	7.6	0.1	
APR	3.4	-0.1	3.4	-2.0	
MAY	2.2	-3.9	3.4	-5.5	
JUN	1.1	-2.2	2.5	-6.6	
1996					
JAN	5.1	2.1	3.5	2.4	
FEB	7.7	-0.9	8.4	1.6	
MAR	7.5	0.6	7.8	1.5	
APR	3.0	2.6	5.4	1.1	
MAY	8.5	3.6	8.0	2.2	
JUN	8.5	5.2	9.6	1.2	
1997					
JAN	-0.9	1.6	0.1	0.3	
FEB	0.8	-5.7	-2.3	-4.2	
MAR	8.8	6.2	8.1	2.2	
APR	1.4	-0.7	3.2	-3.1	
MAY	0.0	4.2	10.5	3.5	
JUN	4.6	4.9	8.9	-0.6	
1998					
JAN	4.2	2.0	6.9	5.4	
FEB	-1.5	-3.1	4.6	-2.8	
MAR	6.4	2.1	5.7	1.0	
APR	0.6	-2.0	0.8	-2.9	
MAY	5.0	0.3	5.3	-0.5	
JUN	-2.3	-1.1	3.0	-6.1	
1999					
JAN	7.8	5.4	8.9	8.0	
FEB	4.7	-0.5	7.6	2.1	
MAR	7.4	4.1	8.6	6.7	
APR	-0.9	-5.7	-1.8	-1.9	
MAY	-0.4	-1.0	4.9	-0.1	
JUN	1.8	0.2	6.3	-3.1	
2000					
JAN	2.5	3.6	10.0	4.0	
FEB	4.4	-0.9	9.8	5.0	
MAR	1.8	1.0	6.8	2.0	
APR	8.6	7.2	7.0	6.0	
MAY	9.2	7.4	11.0	5.9	
JUN	5.8	3.3	8.8	2.8	
2001					
JAN	-9.2	-2.6	1.3	1.0	
FEB	-11.5	-2.0	1.0	-4.0	
MAR	-7.8	4.4	9.0	1.9	
APR	-8.5	3.0	2.2	-1.1	
MAY	-3.9	6.3	9.5		
JUN	-6.0	3.7	9.0		
	-7.8	2.2	5.3		
YEAR	EAST MOUNTAIN	ELECTRIC LAKE	HUNTER PLANT	HUNTINGTON PLANT	TOTAL
1982		-2.8	0.0	1.2	-0.5
1983		-2.7	2.5	1.0	0.3
1984		-2.2	0.5	0.1	-0.5
1985	3.1	0.3	3.0	0.9	1.8
1986	2.9	3.4	6.3	3.2	4.0
1987	1.7	-0.5	3.2	1.1	1.4
1988	-0.2	-0.1	3.5	0.5	0.9
1989	0.0	-0.1	4.1	0.3	1.1
1990	2.3	1.8	7.3	1.2	3.2
1991	-1.9	-1.4	3.8	-2.5	-0.5
1992	1.9	6.5	6.6	1.8	4.2
1993	-0.9	-0.5	4.6	-1.7	0.4
1994	2.9	5.0	6.3	2.7	4.2
1995	3.6	0.5	5.4	-0.9	2.2
1996	6.7	2.2	7.1	1.7	4.4
1997	2.5	1.8	4.8	-0.3	2.2
1998	2.1	-0.3	4.4	-1.0	1.3
1999	3.4	0.8	5.8	2.0	3.0
2000	5.4	3.6	8.9	4.3	5.6
2001	-7.8	2.2	5.3		-0.1

**Table 32**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE RECESSION STUDY**  
**YEAR 2001**

SPRING		JUL	AUG	SEP	OCT
<b>79-10</b>	Flow (GPM)	10.3	5.7	5.1	3.2
	Temp. (C)	5.2	5.4	5.6	3.3
<b>SHEBA SPRINGS</b>	Flow (GPM)	2.9	2.2	1.7	1.0
	Temp. (C)	6.0	6.7	7.4	5.1
<b>ELK SPRING</b>	Flow (GPM)	131.0	85.0	73.0	67.0
	Temp. (C)	4.0	3.9	4.0	3.5
<b>79-35</b>	Flow (GPM)	4.5	2.5	2.0	1.6
	Temp. (C)	4.6	5.3	4.9	5.5
<b>79-26</b>	Flow (GPM)	4.3	2.4	2.0	1.6
	Temp. (C)	7.7	5.2	5.0	5.5
<b>79-29</b>	Flow (GPM)	1.5	1.4	1.4	1.0
	Temp. (C)	4.4	4.6	5.2	3.4
<b>84-56</b>	Flow (GPM)	0.8	0.5	0.5	0.4
	Temp. (C)	5.5	5.6	5.9	3.6
<b>80-44</b>	Flow (GPM)	est. < 0.5 gpm	est.<0.5gpm	<0.5gpm	<0.5gpm
	Temp. (C)				
<b>80-46</b>	Flow (GPM)	2.1	2.3	1.0	Damp
	Temp. (C)	4.6	6.3	6.2	
<b>BURNT TREE</b>	Flow (GPM)	5.6	5.3	10.0	6.0
	Temp. (C)	5.4	6.6	7.0	5.6
<b>79-23</b>	Flow (GPM)	dry	dry	dry	dry
	Temp. (C)				
<b>82-52</b>	Flow (GPM)	8.0	6.2	5.8	4.1
	Temp. (C)	4.1	4.5	4.2	4.3

TABLE 34: NEWUA - RILDA CANYON SPRING FLOW (GPM)  
MONTHLY MEASUREMENTS

DATE	METER 2	METER 3	METER 4	TOTAL
09/06/1990	20	75	120	215
09/18/1990	15.8	78.9	91	186
11/07/1990	13.3	37.5*	20	71
11/14/1990	14.5	67.4	9.3	91
11-19-90**	13.6	57.7	6.3	78
04/08/1991	10.9	56.5	4.7	72
06/11/1991	10.9	107	136	253.9
07/17/1991	12.5	95	160	267.5
08/19/1991	9.3	95	160	264.3
09/10/1991	9.2	105	140	254.2
10/21/1991	7.5	85	55	147.5
11/20/1991	8	80	16.2	104.2
04/07/1992	8	46	7.7	61.7
05/18/1992	7.5	110	140	257.5
06/12/1992	7	100	180	287
07/20/1992	7	80	150	237
08/14/1992	7.1	90	110	207.1
09/03/1992	6	35	75	116
10/20/1992	5.5	45	2.6	53.1
05/13/1993	6	25	13	44
06/11/1993	8.6	90	150	248.6
07/29/1993	6	110	170	286
08/27/1993	4	96	170	270
09/28/1993	2	60	110	172
10/22/1993	3	30	55	88
05/24/1994	4.6	65	75	144.6
06/16/1994	5	100	160	265
07/18/1994	5.5	100	130	235.5
08/24/1994	2	70	80	152
09/13/1994	2.7	30	20	52.7
10/23/1994	2	30	1.5	33.5
12/14/1995	2	38	***	40
06/28/1995	8	over capacity	***	
07/21/1995	2	over capacity	***	
08/24/1995	4	over capacity	***	
09/15/1995	2.3	150	***	157.3
10/31/1995			NEWUA conducting maintenance	
11/30/1995	3.3	75	***	78.3
04/02/1996	8	100	***	108
05/17/1996	5	175	***	180
06/11/1996	5.5	175.0'	***	180
07/23/1996	5.5	200.0'	***	205
08/21/1996	4.5	150.0'	***	154.5
09/16/1996	4.5	150.0'	***	154.5
10/23/1996	3.8	80	***	83.8
11/14/1996	4	80	***	84
12/12/1996	4	100	***	104
1996 problems: Valve seating affected flow measurements				
	METER 2	METER 3	TOTAL	NEWUA METER
04/28/1997	5.2	150	+ 150.0 ****	94.0 *****
05/29/1997	6	150	+ 150.0 ****	230
06/25/1997	6	150	+ 150.0 ****	300
07/17/1997	6	150	+ 150.0 ****	270
08/24/1997	5.5	150	+ 150.0 ****	270
09/15/1997	5.5	150	+ 150.0 ****	270
10/13/1997	5	150	+ 150.0 ****	180
11/18/1997	3.9	100	+100.0 ****	160
12/04/1997	4	100	+100.0 ****	150
	METER 2	METER 3	TOTAL	NEWUA METER
04/14/1998	6.7	100		120
05/27/1998	7.5	158		145
06/06/1998	10.3	+100.0 ****		280
07/06/1998	7.5	+100.0 ****		300
08/10/1998	7.1	+100.0 ****		300
09/14/1998	6.0	+100.0 ****		240
10/05/1998	6.0	+100.0 ****		200
11/09/1998	6.7	172		180
12/09/1998	5.0	95		150
	METER 2	METER 3	TOTAL	NEWUA METER
01/12/1999	5.0	120	125+	150
02/02/1999	6.3	90	96+	120
03/03/1999	6.6	80	87+	110
04/13/1999	5.0	65	70+	120
05/11/1999	5.5	100	106+	130
06/15/1999	6.6	150	157+	240
07/24/1999	6.9	170	177+	250
08/12/1999	6.7	200	207+	270
09/16/1999	6.0	200	206+	225
10/05/1999	4.0	200	204	200
11/17/1999	3.2	100	103	130
12/09/1999	2.5	80	83	110
	METER 2	METER 3	TOTAL	NEWUA METER
01/12/2000	2.2	60	62.2+	110
02/03/2000	3.4	53	56.4+	120
03/09/2000	++	++	++	120
04/05/2000	++	++	++	150
05/05/2000	3	86	89+	270
06/22/2000	3	160	163+	270
07/04/2000	2.1	170	172.1+	340
08/09/2000	1.6	200	201.6*	280
09/13/2000	1.2	120	121.2*	160
10/10/2000	1.7	50	51.7*	130
11/28/2000	1.4	65	66.4*	100
12/05/2000	1.07	61	62.1*	100
	METER 2	METER 3	TOTAL	NEWUA METER
01/05/2001	1.02	62.5	63.52*	100
02/05/2001	Inaccessible			90
03/13/2001	Inaccessible			60
04/23/2001	1.5	52	53.5	60
05/21/2001	1.9	140	141.9	150
06/29/2001	1.6	214	215.6	210
07/03/2001	1.2	200	201.2	210
08/14/2001	1.1	180	181.1	220
09/17/2001	1	162	163	180
10/17/2001	1.5	150	151.5	120
11/27/2001	1.6	100	101.6	100
12/12/2001	Lid Frozen	40	40*	70

\* Flow not stabilized.  
\*\* Data collected during pump test.  
\*\*\* Diverted through Meter 3.  
\*\*\*\* Over capacity  
\*\*\*\*\* Meter problems  
+ Meter 3 - Valve would not seat  
++ Canyon Accessible

**TABLE 35**  
**NEWUA - RILDA CANYON SPRINGS**  
**AVERAGE WATER QUALITY\***

PARAMETER **	METER 2		METER 3		METER 4	
	2001	Historical	2001	Historical	2001	Historical
Bicarbonate	442	434	390	395	Combined with Meter 3 in 1995	356
Calcium	89.0	88.4	74.3	77.4		70.3
Carbonate	<1	1.8	<1	2.1		0.7
Chloride	8.5	11.2	6.9	10.3		13.1
Cond.(umhos/cm)	954	767	804	675		535
Hardness	438	431	376	382		348
Iron	<0.1	0.13	<0.1	0.10		0.13
Magnesium	52.50	51.10	46.30	45.77		41.90
Mangnese	<0.1	0.11	<0.1	0.08		0.08
pH(units)	7.20	7.28	7.30	7.39		7.40
Potassium	3.00	2.65	2.00	1.96		2.13
Sodium	19.50	15.40	16.33	13.91		12.96
Sulfate	132.0	95.6	96.1	76.7		55.4
TDS	584	485	442	425		365

\* Quality parameters reported as mg/l unless otherwise noted

\*\* Data: Database input restricted to values greater then laboratory minimum detection limit.  
Flow through Meter 4 was combined with Meter 3 in 1995

**Table 36**  
**TRAIL MOUNTAIN**  
**SPRING DISCHARGE RECESSION STUDY**  
**YEAR 2001**

SPRING		JUL	AUG	SEP	OCT	Seasonal Net Change %
T-6	Flow (GPM)	4.8	2.2	1.7	1.0	-79.2
18-2-1	Temp. (C)	10	9	8	7	
T-8	Flow (GPM)	0.4	0.3	0.3	0.3	-31.6
17-21-1	Temp. (C)	13	10	10	6	
T-9	Flow (GPM)	6.0	3.3	3.0	1.5	-75.0
17-22-1	Temp. (C)	8	6	6	6	
T-10	Flow (GPM)	0.2	0.2	0.2		
17-26-4	Temp. (C)	15	7	7	0.0	
T-14	Flow (GPM)	0.5	0.5	0.5		
17-25-1	Temp. (C)	16	9	9	0.0	
T-14A	Flow (GPM)	0.0	0.0	0.0	0.0	
17-26-5	Temp. (C)					
T-15	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-1	Temp. (C)					
T-16	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-2	Temp. (C)					
TM-23*	Flow (GPM)	0.0	0.0	0.0	0.0	
	Temp. (C)					

**JULY TOTAL 11.9**

**OCTOBER TOTAL 2.76**

**Net Change - Average -61.92**

**Net Change - By Volume -76.77**

**TOTAL FOR JULY 2001 = 11.9**

**JULY 2001 74% LOWER THAN JULY 2000**

TABLE 37: TRAIL MOUNTAIN YEARLY SPRING DISCHARGE VARIATIONS (GPM)

JULY FLOW DATA														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Spring						***								
T-6 (18-2-1)	11	0.5	0.5	1.2	0.03	6	1.6	4.1	3.3	7.5	9.8	3.5	3	4.8
T-8 (17-21-1)	4.7	0.2	0.25	Dry	0.14	1.7	0.2	1.7	0.6	0.9	2.1	1.4	0.4	0.4
T-9 (17-22-1)	8	0.2	0.1	Dry	2.5	40	4	20	8.6	4.8	24	10.9	2.7	6
T-10 (17-26-4)	4.7	Dry	0.15	Dry	Dry	0.4	Damp	0.4	0.2	0.4	0.5	0.7	0.3	0.2
T-14 (17-25-1)	5	Dry	Dry	Dry	Dry	1.6	Damp	2	0.9	1	2.1	2.1	0.3	0.5
T-14A (17-26-5)	10	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Damp	Dry	0
T-15 (17-35-1)	2.1	0.2	0.5	0.75	0.33	1.6	0.5	1.2	0.8	1	3.3	2.3	0.9	0
T-16 (17-35-2)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Damp	Damp	Dry	0
T-23 (17-14-4)	22**	4.0*	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	57.8***	84.4	39.7	0
TOTAL	67.5	5.1	1.5	1.95	2.67	51.3	6.3	29.4	14.4	15.6	99.6	105.3	47.2	11.9

\* August measurement

\*\* September measurement

\*\*\* First year monitored by PacificCorp

\*\*\*\* Cottonwood Creek Gain/Loss Survey - November 10, 1998



Table 38: Trail Mountain Springs Water Quality (Historical vs. 2001) \*

PARAMETER	18-2-1		17-21-1		17-22-1		17-26-4		17-25-1	
	Historical	2001	Historical	2001	Historical	2001	Historical	2001	Historical	2001
Elevation										
Geologic Formation										
Bicarbonate	403	400	399	397	336	303	398	403	537	700
Calcium	61.0	62.0	53.0	52.0	48.0	41.0	55.1	52.0	88.2	116.0
Carbonate	1.48	<5	1.53	<5	3.41	<5	8.33	<5	3.50	<5
Chloride	46.0	46.7	31.0	16.3	10.7	6.9	28.6	34.0	31.4	34.1
Cond (umhos/cm)	938	1238	703	872	550	603	707	896	1157	1378
Hardness	383	394	244	239	264	230	334	323	481	553
Iron	0.11	<0.1	0.11	<0.1	0.11	<0.1	0.11	<0.1	0.13	<0.1
Magnesium	56.00	58.00	28.02	26.50	35.01	31.00	47.50	47.00	59.02	64.00
Manganese	0.05	<0.1	0.06	<0.1	0.06	<0.5	0.11	<0.1	0.50	0.60
pH(units)	7.67	7.28	7.63	7.00	7.72	7.57	8.03	8.00	7.85	7.84
Potassium	1.70	<1	2.10	2.00	1.67	<0.1	1.75	3.00	2.31	2.00
Sodium	66.32	71.00	61.20	63.50	21.94	16.00	33.29	34.00	68.75	30.00
Sulfate	134.2	196.0	18.0	18.4	20.4	12.0	33.1	30.0	227.3	30.0
TDS	576	648	396	401	304	257	397	436	720	782

PARAMETER	17-35-1		17-35-2		17-14-4		ARCO'S		ENERGY WEST	
	Historical	2001	Historical	2001	Historical	2001	Historical	2001	Historical	2001
Elevation										
Geologic Formation										
Bicarbonate	388	No Flow	No Flow	No Flow	363	No Samples	T-6	T-8	18-2-1	17-21-1
Calcium	41.6	During 2001	Historical Flow	During 2001	65.9	During 2001	T-9	T-10	17-22-1	17-26-4
Carbonate	5.71				13.91		T-14	T-15	17-25-1	17-35-1
Chloride	42.47				641		T-16	TN-23	17-35-2	17-14-4
Cond (umhos/cm)	770				346					
Hardness	251				0.19					
Iron	0.48				43.95					
Magnesium	36.30				0.02					
Manganese	0.08				7.77					
pH(units)	8.00				1.95					
Potassium	1.55				15.83					
Sodium	80.00				61.8					
Sulfate	45.2				385					
TDS	441									

Spring 17-26-5 Removed - No Evidence of Spring  
 \* Quality parameters reported as mg/l unless otherwise noted  
 \*\* High TSS. Elevated Total Iron

TABLE 39: DEER CREEK IN-MINE WATER QUALITY \*

2001*** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
TW-10														
20010328	381	68		4	732	318		36		7.19	1	14	42	338
20010926	391	68		4.6	712	322		37		7.32	1	15	44.6	365
20011217	375	69		3.9	641	321		36		7.3		14	45.7	360
2001***														
MIN	375	68		4	641	318		36		7.19	1.00	14	42	338
MAX	391	69		5	732	322		37		7.32	1.00	15	46	365
MEAN	382	68		4	695	320		36		7.27	1.00	14	44	354
No. of Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3
HISTORICAL 1988-2000														
MIN	279	61.3	0.1	0.4	450	279	0.01	18.70	0.01	6.60	0.01	9.81	27.00	313
MAX	714	211.0	5.0	30.0	950	732	1.17	77.10	1.21	8.40	5.00	55.03	350.00	505
MEAN	385	79.6	1.6	8.5	616	355	0.17	36.10	0.09	7.42	1.43	15.78	52.73	378
MN-ME**														
20010328	470	99		6	1002	461		52		7.54	3	18	128	528
20010926	462	101		7	996	475		54		7.89	3	19	135.9	562
20011217	464	101		6.4	907	466		52		7.76	3	18	141.2	563
2001***														
MIN	462	99.0		6	907	461		52.00		7.54	3.00	18.0	128	528
MAX	470	101.0		7	1002	475		54.00		7.89	3.00	19.0	141.2	563
MEAN	465	100.3		6.5	968	467		52.67		7.73	3.00	18.3	135.0	551
No. of Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3
HISTORICAL 1991-2000														
MIN	355.0	69.0	0.1	4	500	329	0.01	38.00	0.01	6.90	0.74	15.0	40	240
MAX	469	100.0	5.0	25.0	897	441	2.81	50.00	0.20	7.99	14.00	37.16	118.0	566
MEAN	424	86.7	2.0	8.9	755	398	0.26	43.90	0.07	7.57	3.12	18.86	87.8	464

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Sample site initiated during 1991.

\*\*\* 1997 Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 40: DEER CREEK MINE - DISCHARGE WATER QUALITY\***

Parameters	2001**				Historical - (1976-2000)			
	Minimum	Maximum	Mean	No. of Analysis	Minimum	Maximum	Mean	No. of Analysis
pH (units)	7	7.3	7.14	12	6.76	8.51	7.55	316
Acidity				12	0.1	97	13.2	265
Chloride	7.1	19	11.75	12	0.7	285	20	297
Conductivity (umhos/cm)	705	1042	905	13	480	1900	922	310
Iron (total)	0.1	2.1	0.72	13	0.01	7.53	0.6	306
Oil & Grease	Visual Observation - No Samples During 2001				0.1	48.8	3.21	238
Sulfate	79.8	117	93.9	12	13	518	206	305
TDS	369	603	467	13	289	1111	608	316
TSS	5	15	9.78	9	0.1	2784	58	307

\* Quality parameters reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 41: WILBERG/COTTONWOOD IN-MINE WATER QUALITY \*

2001** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)		HARDNESS	IRON DISSOLVED		MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
20010309	632	165		13	1729		848			106		7.11	4	22	460	1124
2001**																
MIN	632	165		13	1729		848			106		7.11	4.00	22	460	1124
MAX	632	165		13	1729		848			106		7.11	4.00	22	460	1124
MEAN	632	165		13	1729		848			106		7.11	4.00	22	460	1124
No. of Analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
HISTORICAL 1983-2000																
MIN	403	116.0	0.1	6.0	1000		725	0.01	0.01	5.40	0.01	6.50	0.30	5.80	250.0	664
MAX	676	330.0	5.0	160.0	2600		1022	0.30	0.30	134.40	0.20	8.07	7.40	36.90	690.0	1328
MEAN	564	171.0	1.6	20.5	1491.0		867.0	0.11	0.11	105.49	0.05	7.25	4.22	22.58	411.2	1049
TMA XC-32																
20010309	450	104		11	1273		543	0.2	0.2	69		7.01	8	41	306	770
20010418	448	107		11	1220		543			67		7.07	8	42	213	761
20010504	439	106		11	1440		553	0.3	0.3	70		7.15	8	41	259	757
2001**																
MIN	439	104		11	1220		543			67		7.01	8	41	213	757
MAX	450	107		11	1440		553			70		7.15	8	42	306	770
MEAN	446	106		11	1311		546			69		7.08	8.0	41	259	763
No. of Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
HISTORICAL 1983-2000																
MIN	379	114	1	7	1171		581	0.10	0.10	72	0.10	7.03	6	33	256	816
MAX	467	133	5	17	1352		688	0.70	0.70	90	0.20	8.20	10	44	491	993
MEAN	440	121	4	12	1254		616	0.25	0.25	76	0.11	7.30	7	39	347	880

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* 1997 Data: Database input restricted to values greater than laboratory minimum detection limit.

MINED SEALED MAY 2001 - SAMPLING TERMINATED

TABLE 42 : WILBERG/COTTONWOOD - DISCHARGE WATER QUALITY

GRIMES WASH									
2001					Historical - (1976-2000)				
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis	
pH	7.4	8.27	7.94	5	6.9	8.47	7.7	267	
Acidity				5	0.1	62	10.61	193	
Bicarb. Alkalinity	347	366	356	5	190	539	365	168	
Chloride	17	38	28.4	5	0.6	80	17	242	
Conductivity	1215	1611	1432	5	490	1590	1032	200	
Iron	0.5	0.5	0.5	5	0.01	3	0.33	232	
Oil & Grease	Visual Observation - No Samples During 2001				0.1	23.8	2.3	193	
Sulfate	337	406	363	5	29.2	600	262	244	
TDS	807	886	856	5	407	1287	668	268	
TSS					0.1	222	7.8	262	

MILLER CANYON									
2001					Historical - (1984-2000)				
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis	
pH				No Discharge During 2001	6.4	8.83	7.3	81	
Acidity					0.1	100	22.45	72	
Bicarb. Alkalinity					267	543	408.7	79	
Chloride					10	155	22.14	77	
Conductivity					480	1900	1216	81	
Iron					0.01	1.38	0.24	79	
Oil & Grease					0.1	7.2	2.1	71	
Sulfate					200	680	419.3	79	
TDS					413	1182	926	81	
TSS					0.1	32	4.8	109	

TMA001									
2001					Historical - (2001)				
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis	
pH	7.23	8.08	7.84	7	Discharge Re-located From Grimes Wash July 2001				
Acidity				7					
Bicarb. Alkalinity	376	409	395	7					
Chloride	23.5	34.2	26.1	7					
Conductivity	1127	1436	1240.7	7					
Iron	0.1	0.1	0.1	7					
Oil & Grease	Visual Observation - No Samples During 2001								
Sulfate	290	322	300	7					
TDS	753	803	776	7					
TSS				7					

TABLE 43: TRAIL MOUNTAIN IN-MINE WATER QUALITY \*

2001** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS		IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
	BICARBONATE	CARBONATE														
UG-3																
20010309	319		36		12	647	209			29		8.07	4	41	40	319
2001**																
MIN	319		36.0		12	647	209			29		8.07	4	41	40	319
MAX	319		36.0		12	647	209			29		8.07	4	41	40	319
MEAN	319		36.0		12	647	209			29		8.07	4	41	40	319
No. of																
Analysis	1		1		1	1	1		1	1		1	1	1	1	1
HISTORICAL 1985 - 2000																
MIN	260		26.0	0.1	2	380	151	0.03	0.03	20	0.03	7.41	2.10	33	15	252
MAX	344		49.3	25.0	16	696	222	0.20	0.20	29	0.20	8.48	5.00	61	130	424
MEAN	305		34.1	7.3	9	540	189	0.12	0.12	25	0.10	8.09	3.60	46	34	308

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 44 : TRAIL MOUNTAIN - DISCHARGE WATER QUALITY****@ COTTONWOOD CANYON PORTALS**

	2001				Historical			
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis
pH	7.85	8.45	8.22	5	7.8	8.53	8.26	60
Acidity				4				44
Bicarb. Alkalinity	341	477	437	4	555	922	782	44
Chloride	25	37	29	4	10	410	37.2	45
Conductivity	1230	1507	1319	6	116	1655	1481	49
Iron	0.3	0.3	0.3	6	0.3	2.3	0.57	65
Oil & Grease	Visual Observation - No Samples During 2001				2	2	2	4
Sulfate	131	292	188	4	50	277	150	44
TDS	671	825	707	6	682	1072	957	64
TSS	5	5	5	6	5	42	11.1	35

**OLIPHANT PORTALS**

	2001				Historical			
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis
pH	7.66	7.88	7.76	3	7.54	8.91	8.13	42
Acidity	7	7	7	3	1	10	6.25	12
Bicarb. Alkalinity	280	285	283	3	214	327	282	42
Chloride	6	6.7	6.2	3	4	21	8.42	42
Conductivity	699	776	729	3	482	925	658	39
Iron	<0.5	<0.5	<0.5	3	0.01	0.7	0.16	23
Oil & Grease	Visual Observation - No Samples During 2001				0.4	5	4.4	8
Sulfate	124	127	126	3	90	330	123	42
TDS	382	415	394	3	354	584	411	42
TSS	<5	<5	<5	3	1	90	22.6	23



TABLE 45: WELLS - WATER QUALITY \*

2001** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
DEER CREEK - DCWR-1														
20010314	806	111		792	23100	997		175		7.77	13	5810	12167	18622
20010629	802	110		570.6	23500	942		162		7.66	13	5720	7559	18400
20010917	805	121		771.6	22050	1023		175		7.71	14	5850	11447.3	18112
20011213	792	104		27.3	20200	939		165		7.75	14	5360	11668.6	18064
2001** MIN	792	104		27	20200	939		162		7.66	13	5360	7559	18064
MAX	806	121		792	23500	1023		175		7.77	14	5850	12167	18622
MEAN	801	112		540	22213	975		169		7.72	14	5685	10710	18300
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1989-2000:														
MIN	626	111	0	17	17300	546	0.05	47	0.01	7.34	11	5165	6000	11466
MAX	935	880	15	1140	45000	3351	1.74	351	0.20	8.21	44	9978	18000	24189
MEAN	775	199	2	780	23854	1390	0.30	216	0.07	7.74	19	6670	12937	20726
WILBERG/COTTONWOOD - WCWR-1														
20010309	283	281		2414	15630	2937		543		7.58	21	2660	5772	11524
20010626	289	250		1294	15265	2510		458		7.66	20	2415	3514	10663
20010920	353	308		2528.6	18255	3281		610	0.06	7.68	27	3175	6434	13108
20011213	362	315		2387.9	16290	3340		620		7.73	25	3175	7219.5	14061
2001** MIN	283	250		1294	15265	2510		458		7.58	20	2415	3514	10663
MAX	362	315		2529	18255	3340		620		7.73	27	3175	7220	14061
MEAN	322	289		2156	16360	3017		558		7.66	23.3	2856	5735	12339
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1989-2000:														
MIN	233	132	0	280	10666	1629	0.05	138	0.02	6.90	8.0	851	750	8492
MAX	864	1135	10	4020	120000	8327	9.00	1717	2.48	8.33	119.1	8812	24000	30440
MEAN	419	363	2	2199	25338	3822	0.75	697	0.20	7.65	36.9	4517	9644	17172
TRAIL MOUNTAIN TM-1B														
20010309	469	10		39	910	66		10		8.36	2	172	7	481
20010626	460	10		36	968	62		9		8.51	2	174	5	467
20010920	453	9		39.5	974	60		9		8.66	2	178	4.3	515
20011213	463	10	6	37	827	62		9		8.55	2	175	3.4	480
2001** MIN	453	9		36	827	60		9.0		8.36	2.0	172	3	467
MAX	469	10		40	974	66		10.0		8.66	2.0	178	7	515
MEAN	461	10		38	920	63		9.3		8.52	2.0	175	5	486
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1985-2000:														
MIN	304	2.4	1	16	790	7	0.05	1.0	0.01	8.20	1.0	5	2	450
MAX	1015	14.0	164	717	4580	72	0.20	10.7	0.20	9.55	15.7	1316	664	3290
MEAN	612	7.8	46	101	1373	47	0.14	6.8	0.08	8.55	3.2	317	42	821

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

# APPENDIX A

## 2001

### Daily Contents (Acre Feet)

Daily Contents (Acres feet)													
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Day
1	18742	18367	18060	17711	17283	16925	16585	17332	20971	20691	19687	17387	1
2	18739	18358	18045	17696	17268	16914	16582	17538	20998	20660	19633	17266	2
3	18733	18349	18039	17681	17254	16900	16576	17664	21005	20630	19572	17153	3
4	18730	18343	18033	17667	17243	16888	16573	17743	21035	20610	19508	17042	4
5	18724	18333	18027	17652	17228	16849	16571	17796	21032	20560	19432	16903	5
6	18720	18327	18024	17637	17217	16826	16582	17879	21018	20554	19382	16775	6
7	18714	18318	18021	17623	17202	16806	16590	17947	21008	20547	19312	16621	7
8	18711	18312	18018	17608	17191	16801	16601	18004	21011	20520	19268	16479	8
9	18690	18303	18015	17593	17176	16761	16610	18144	20998	20520	19208	16321	9
10	18668	18294	18015	17579	17165	16753	16621	18327	20998	20500	19155	16178	10
11	18647	18288	18013	17564	17153	16744	16621	18515	20984	20461	19089	16011	11
12	18625	18279	18010	17550	17139	16739	16604	18708	21001	20421	19030	15813	12
13	18604	18273	17995	17535	17128	16730	16579	18909	21005	20411	19002	15636	13
14	18583	18264	17980	17523	17113	16722	16565	19064	20981	20364	18927	15442	14
15	18561	18255	17965	17509	17102	16714	16557	19246	20954	20335	18881	15254	15
16	18540	18249	17950	17497	17090	16708	16540	19432	20940	20308	18847	15074	16
17	18518	18240	17935	17483	17076	16699	16551	19678	20933	20275	18767	14921	17
18	18497	18234	17920	17468	17065	16691	16557	19881	20920	20246	18690	14746	18
19	18482	18225	17906	17456	17050	16660	16579	20040	20903	20210	18619	14585	19
20	18467	18210	17891	17442	17039	16632	16632	20193	20889	20180	18540	14476	20
21	18455	18198	17876	17427	17025	16627	16663	20341	20866	20141	18467	14355	21
22	18446	18183	17861	17416	17013	16618	16702	20434	20835	20102	18376	14232	22
23	18436	18171	17846	17401	17002	16615	16705	20517	20832	20069	18291	14110	23
24	18427	18156	17832	17390	16988	16613	16708	20597	20822	20017	18198	13982	24
25	18421	18141	17817	17375	16976	16607	16711	20681	20788	20007	18090	13864	25
26	18412	18129	17802	17361	16962	16604	16758	20738	20808	19981	18001	13768	26
27	18406	18114	17787	17349	16951	16601	16840	20805	20771	19923	17908	13668	27
28	18397	18099	17770	17335	16939	16599	16922	20872	20728	19877	17808	13578	28
29	18388	18087	17755	17320	16928	16596	17073	20906	20724	19816	17717	13498	29
30	18382	18072	17740	17309	16919	16590	17197	20934	20694	19787	17620	13411	30
31	18373		17725	17294		16587		20964		19748	17488		31

[illegible]

**Utah Power & Light Company  
Stream Discharge Records  
Below Electric Lake 2000 - 2001**

**Daily Discharge (CFS)**

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Day
1	12.80	12.30	12.30	12.30	12.30	12.80	13.70	12.80	16.00	15.50	37.50	54.20	1
2	12.80	12.30	12.30	12.30	12.30	12.80	13.70	12.80	16.70	16.00	38.30	54.20	2
3	13.20	12.30	12.30	12.30	12.30	12.80	13.70	12.80	17.40	18.80	39.20	56.40	3
4	13.20	12.30	12.30	12.30	12.30	12.80	13.70	12.80	17.40	19.50	39.20	48.80	4
5	13.20	12.30	12.30	12.30	12.30	12.80	13.70	12.80	17.40	19.50	39.20	66.80	5
6	13.20	12.30	12.30	12.30	12.80	12.80	13.70	12.80	16.70	19.50	40.00	68.10	6
7	13.20	12.30	12.30	12.30	12.80	12.80	13.70	12.80	16.70	19.50	40.00	68.10	7
8	13.20	12.30	12.30	12.30	12.80	12.80	13.70	13.20	16.70	19.50	40.00	66.80	8
9	13.20	12.30	12.30	12.30	12.80	12.80	13.70	13.20	16.70	19.50	41.10	66.80	9
10	13.20	12.30	12.30	12.30	12.80	12.80	13.70	13.20	16.70	22.20	41.10	65.60	10
11	13.70	12.30	12.30	12.30	12.80	12.80	13.70	13.20	16.00	23.60	41.10	77.00	11
12	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	23.60	41.10	82.10	12
13	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	23.60	42.20	82.10	13
14	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	23.60	42.20	79.60	14
15	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	22.20	31.70	78.30	15
16	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	22.20	35.80	77.00	16
17	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	20.20	46.60	78.30	17
18	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	21.50	49.90	77.00	18
19	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.20	15.50	21.50	49.90	60.80	19
20	12.30	12.30	12.30	12.30	12.80	12.80	13.70	13.70	15.50	21.50	51.00	54.20	20
21	12.30	12.30	12.30	12.30	12.80	12.80	13.20	13.70	15.50	21.50	52.00	54.20	21
22	12.30	12.30	12.30	12.30	12.80	12.80	13.20	13.70	15.50	21.50	52.00	54.20	22
23	12.30	12.30	12.30	12.30	12.80	12.80	13.20	13.70	15.50	23.60	54.20	53.10	23
24	12.30	12.30	12.30	12.30	12.80	12.80	13.20	14.20	15.50	25.80	56.40	53.10	24
25	12.30	12.30	12.30	12.30	12.80	12.80	13.20	14.20	15.50	23.60	56.40	48.80	25
26	12.30	12.30	12.30	12.30	12.80	12.80	13.20	14.20	16.00	23.60	56.40	56.40	26
27	12.30	12.30	12.30	11.80	12.80	13.20	13.20	14.20	15.50	23.60	58.60	42.20	27
28	12.30	12.30	12.30	11.80	12.80	13.20	13.20	14.20	15.50	23.60	59.70	41.10	28
29	12.30	12.30	12.30	11.80	13.20	13.20	13.20	14.20	15.50	23.60	61.90	40.00	29
30	12.30	12.30	12.30	11.80	13.20	13.20	12.80	14.20	15.50	23.60	65.60	40.00	30
31	12.30	12.30	12.30	11.80	13.20	13.20	13.20	14.20	15.50	25.80	65.60	65.60	31
<b>Monthly Totals</b>													<b>Yearly Totals</b>
Total	391	369	381	379	356	399	406	416	479	673	1,466	1,845	7,560
Daily Mean	12.60	12.30	12.30	12.20	12.70	12.90	13.50	13.40	16.00	21.70	47.30	61.50	20.70
Daily Min	12.30	12.30	12.30	11.80	12.30	12.80	12.80	12.80	15.50	15.50	31.70	40.00	11.80
Daily Max	13.70	12.30	12.30	12.30	12.80	13.20	13.70	14.20	17.40	25.80	65.60	82.10	82.10
Ins. Min	3.75	12.30	12.30	11.80	12.30	12.80	12.30	12.80	14.20	15.50	31.70	40.00	3.75
Ins. Max	15.10	12.30	12.30	12.30	12.80	13.20	13.70	14.20	18.10	37.50	65.60	96.20	96.20
Acc Ft	775	732	756	751	706	791	804	826	951	1,330	2,910	3,660	14,992

Note:

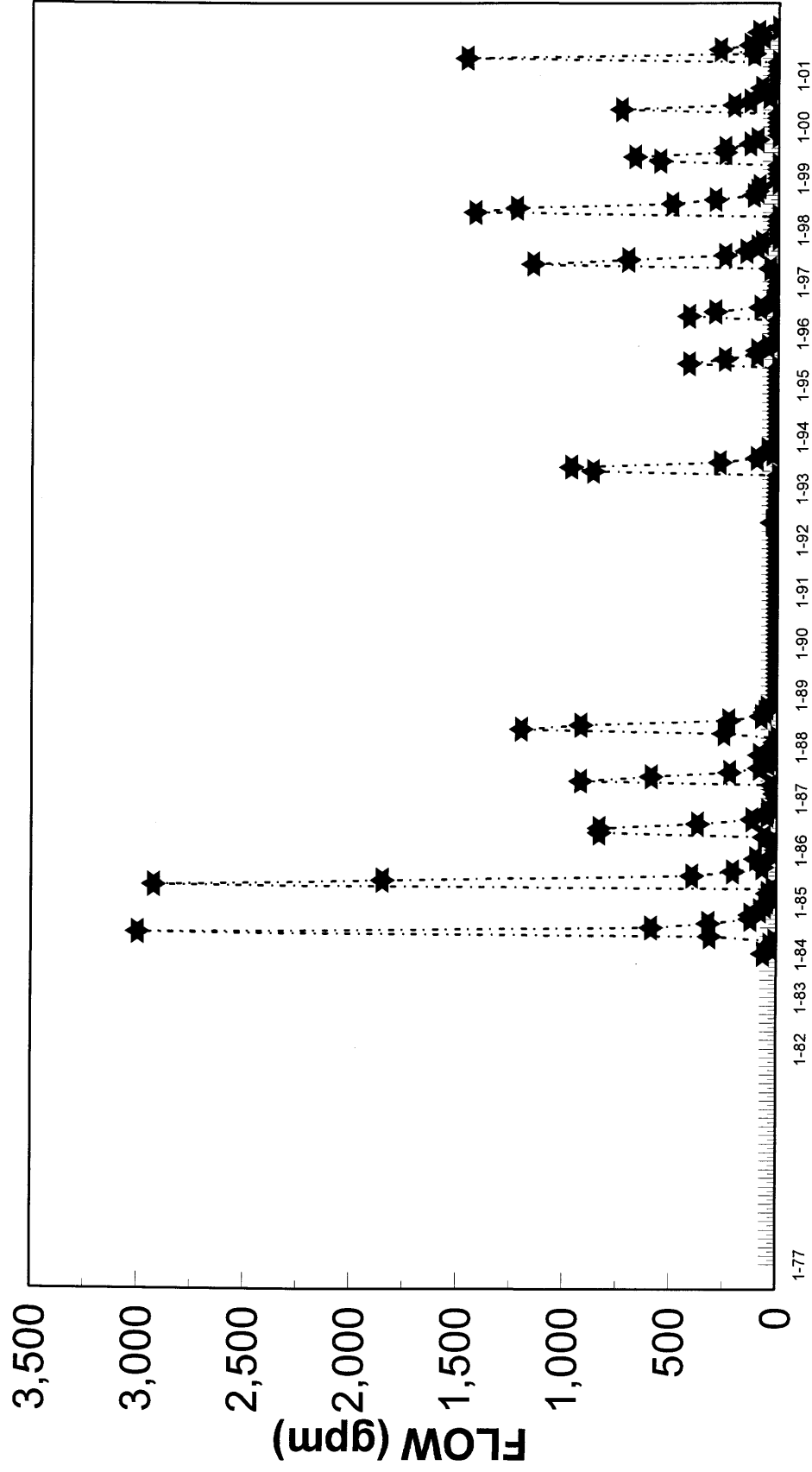


# **APPENDIX B**

## **2001**

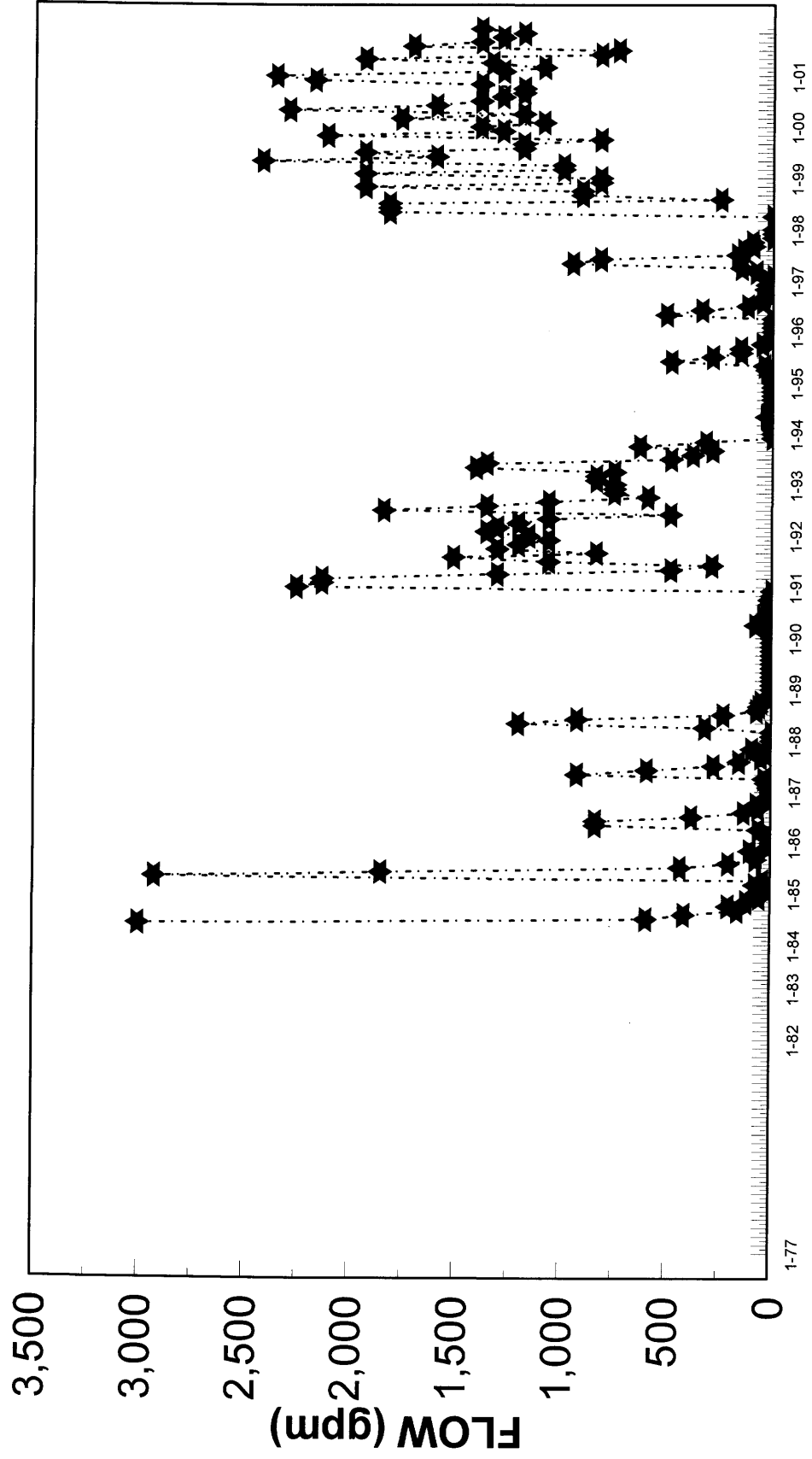
# DEER CREEK

## ABOVE MINE DISCHARGE RECESSION CURVE



# DEER CREEK

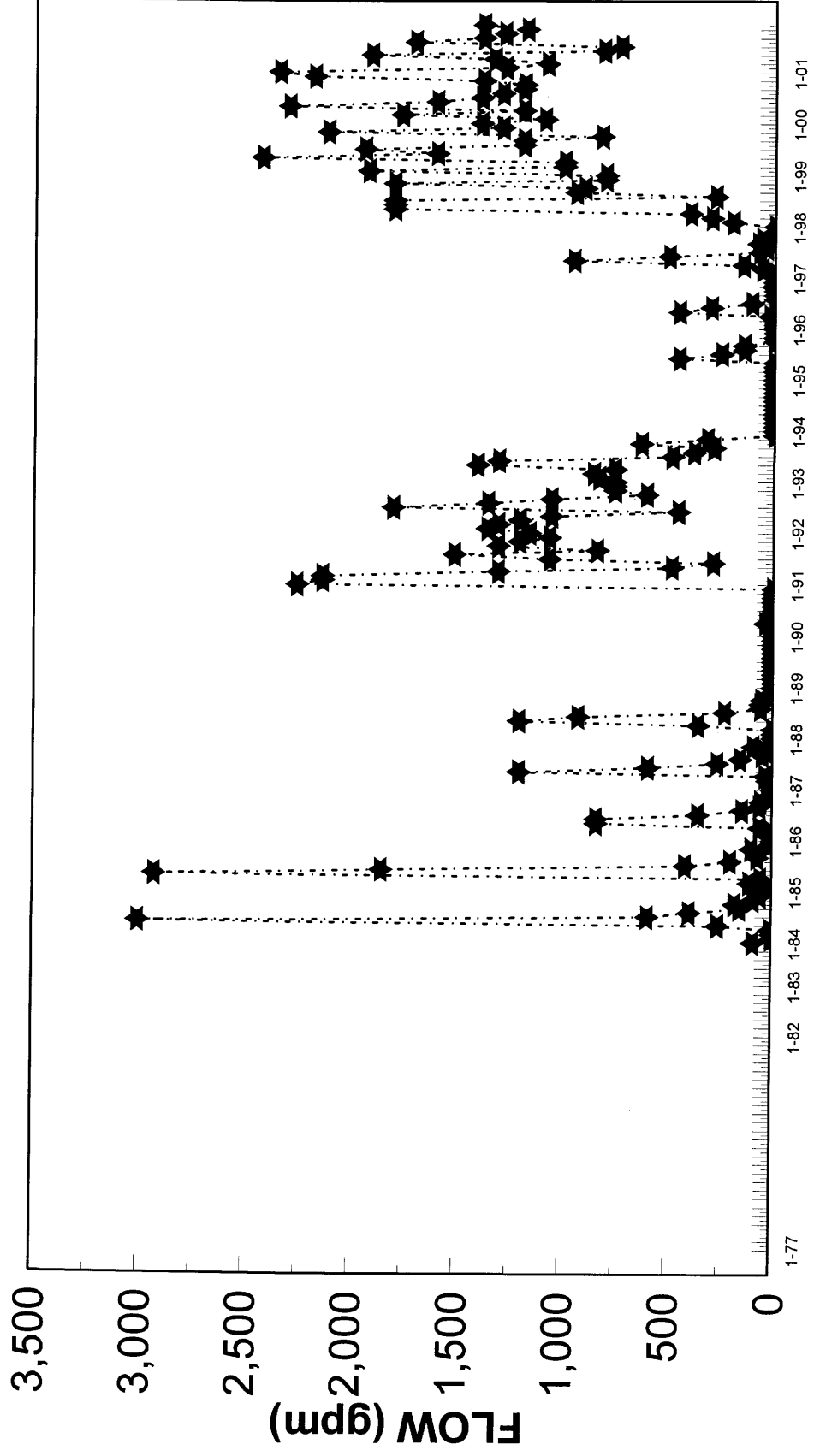
@ PERMIT BOUNDARY  
DISCHARGE RECESSION CURVE





# DEER CREEK

@ BELOW MINE  
DISCHARGE RECESSION CURVE



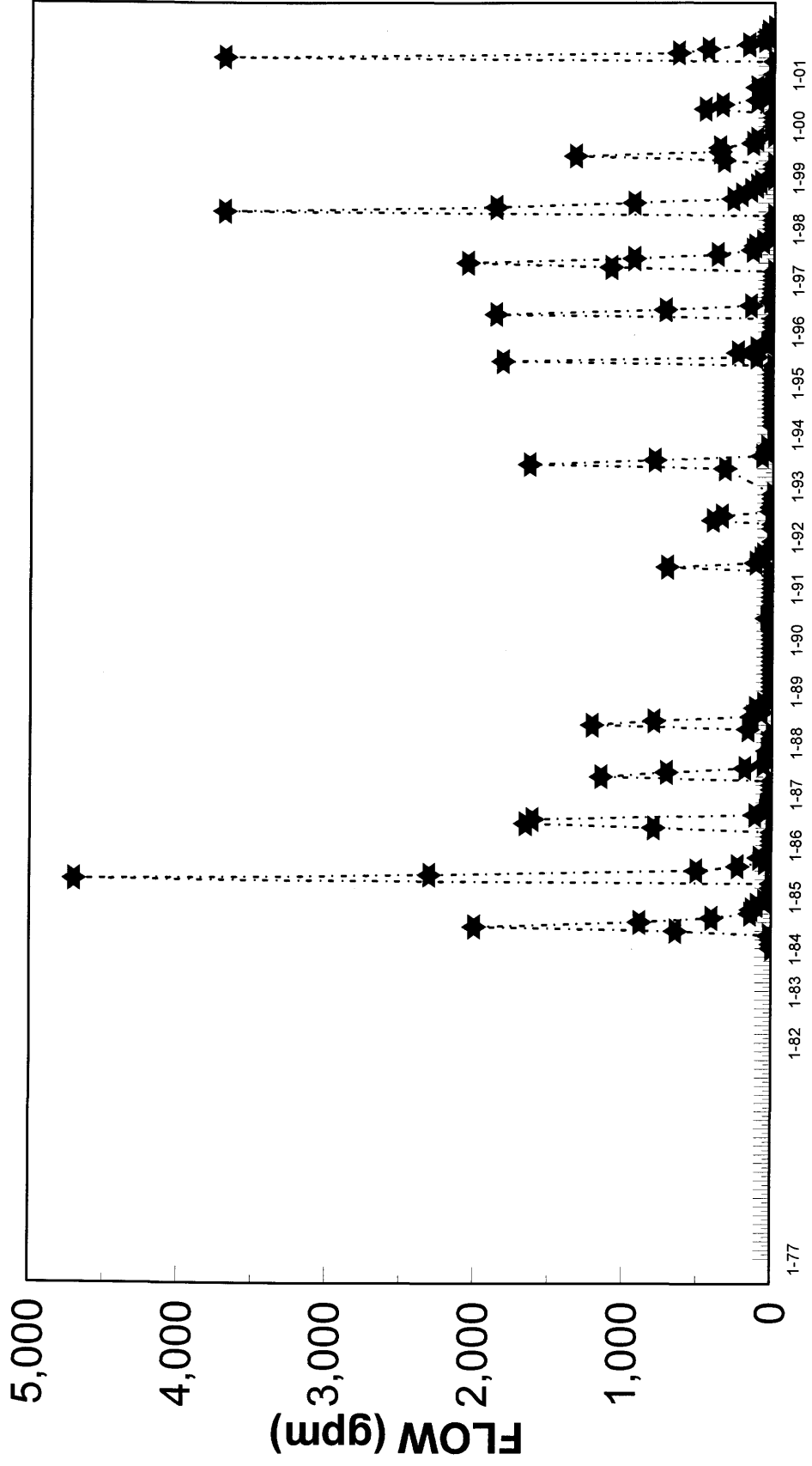
# APPENDIX C

# APPENDIX C

# 2001

# MEETINGHOUSE CANYON

## LEFT FORK DISCHARGE RECESSION CURVE

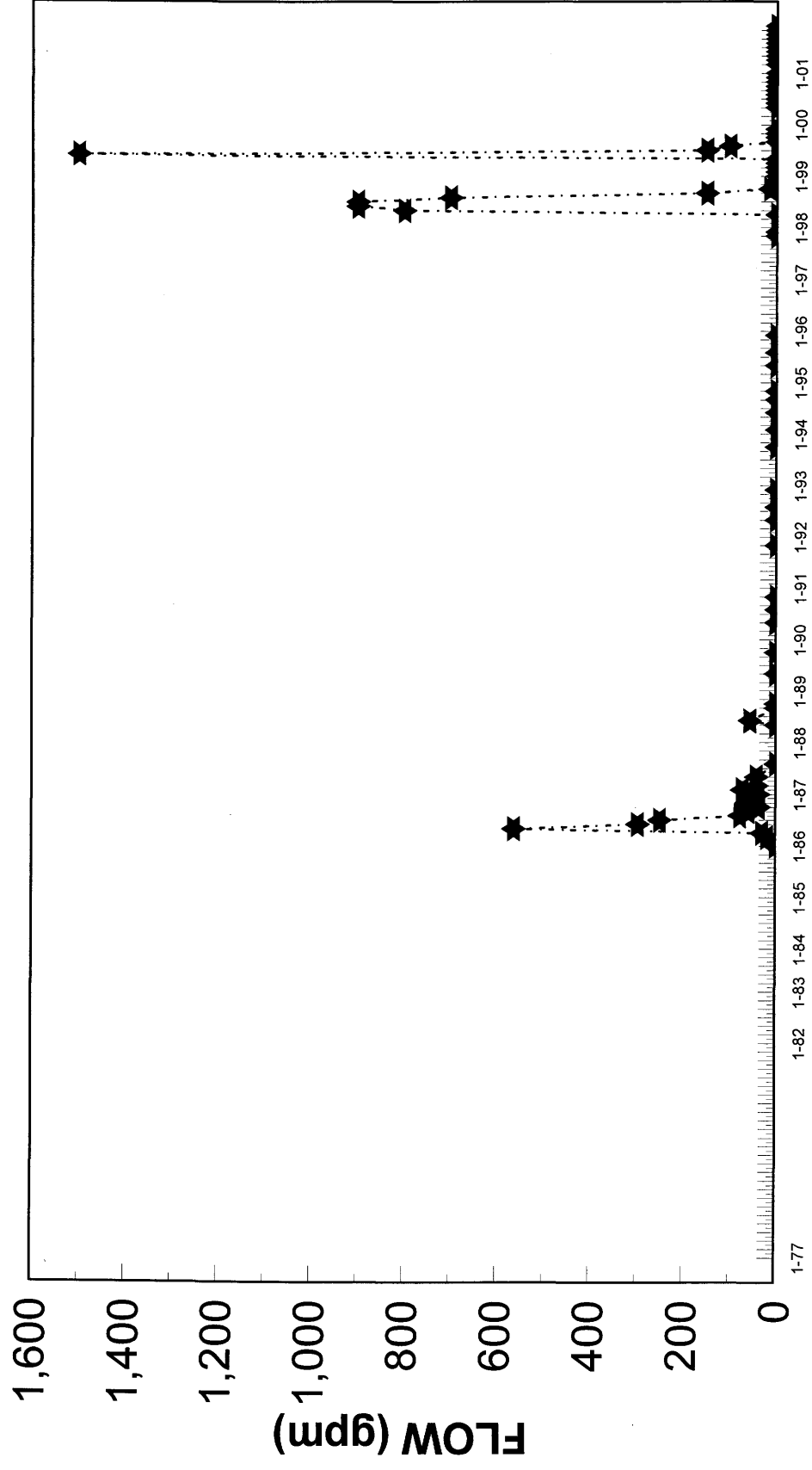


# **APPENDIX D**

## **2001**

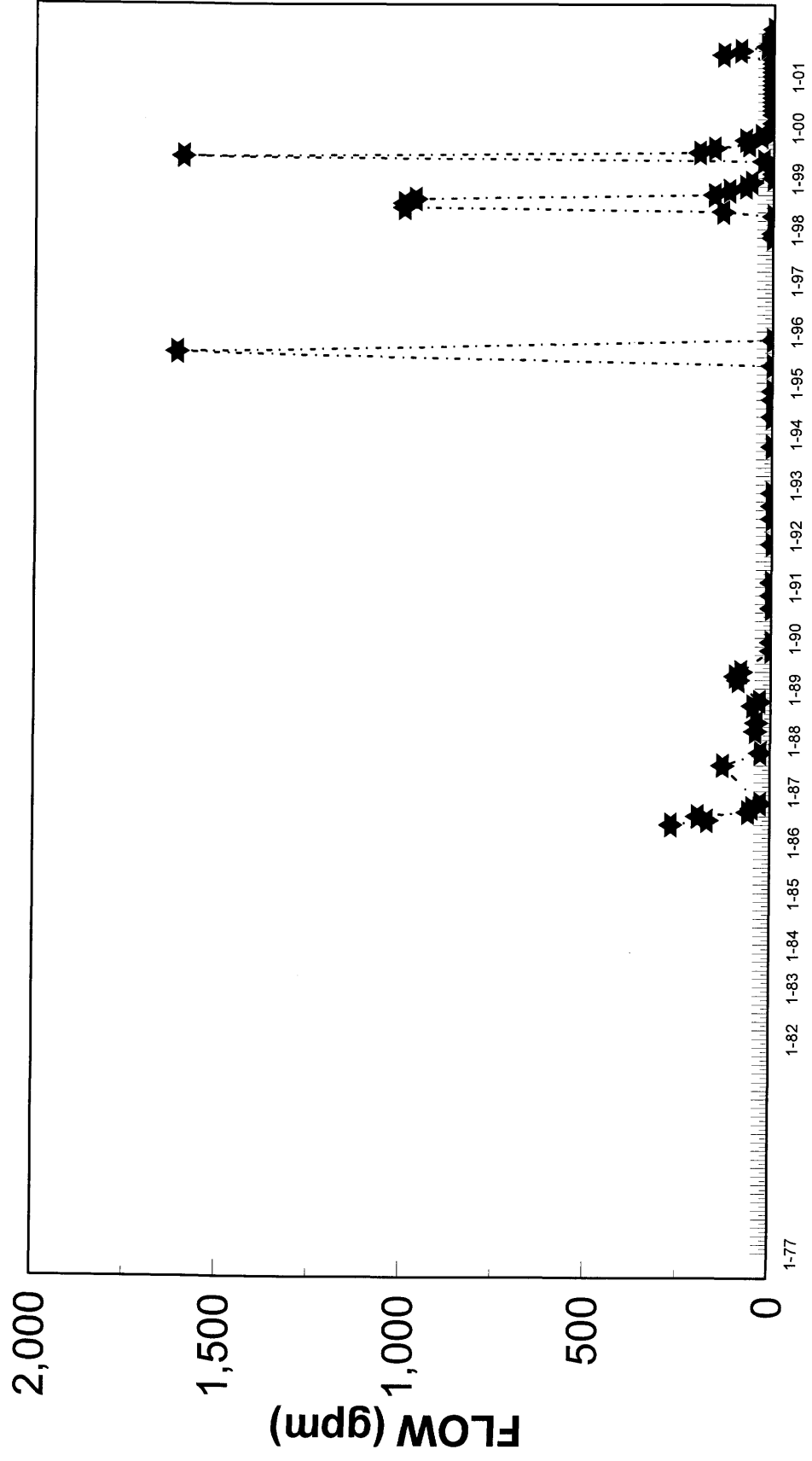
# MILL FORK

## MFA1: ABOVE MINE DISCHARGE RECESSION CURVE



# MILL FORK

MFB2: BELOW MINE  
DISCHARGE RECESSION CURVE



# **APPENDIX E**

## **2001**

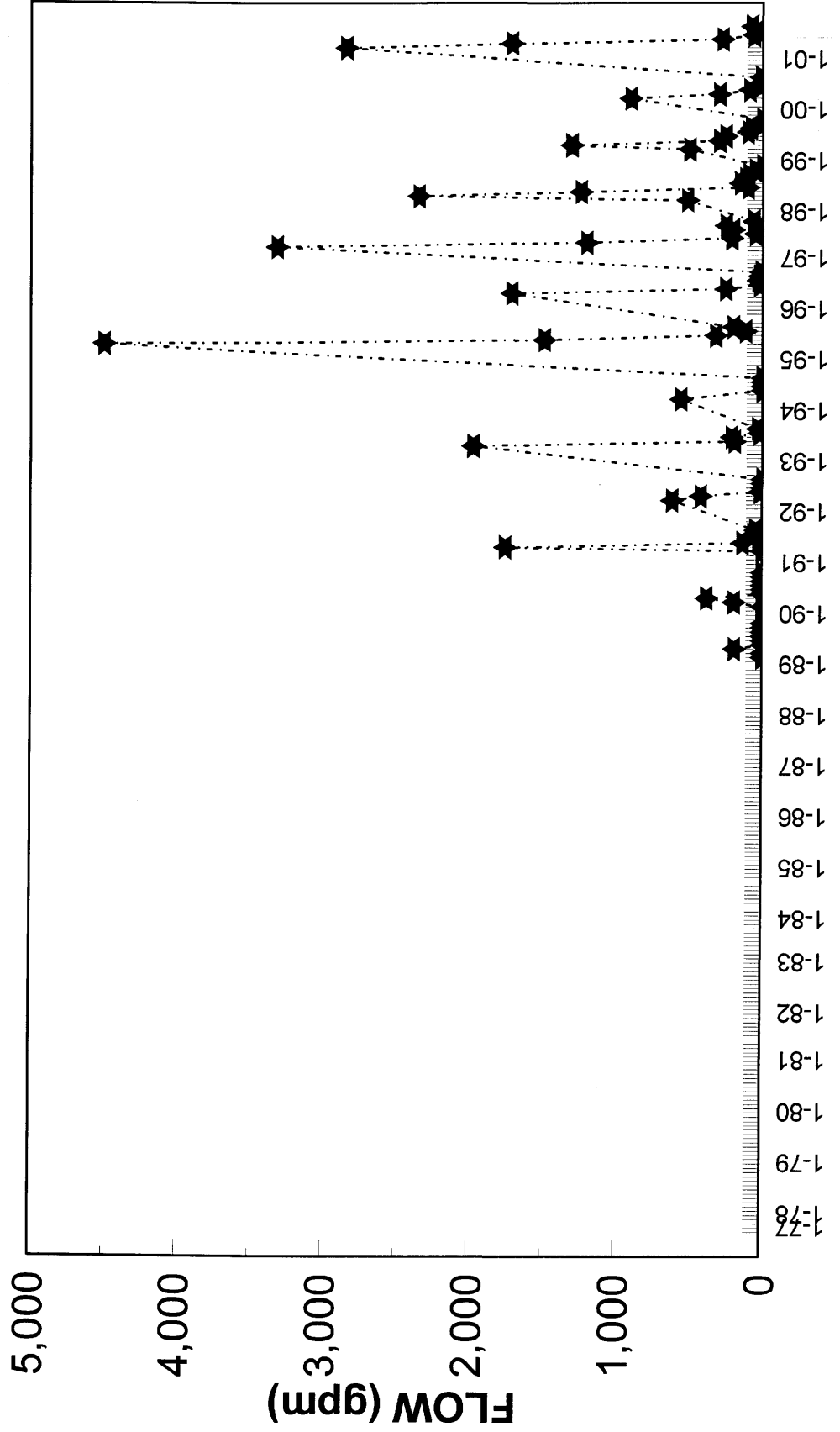
# MONITORING WELLS PIEZOMETRIC DATA





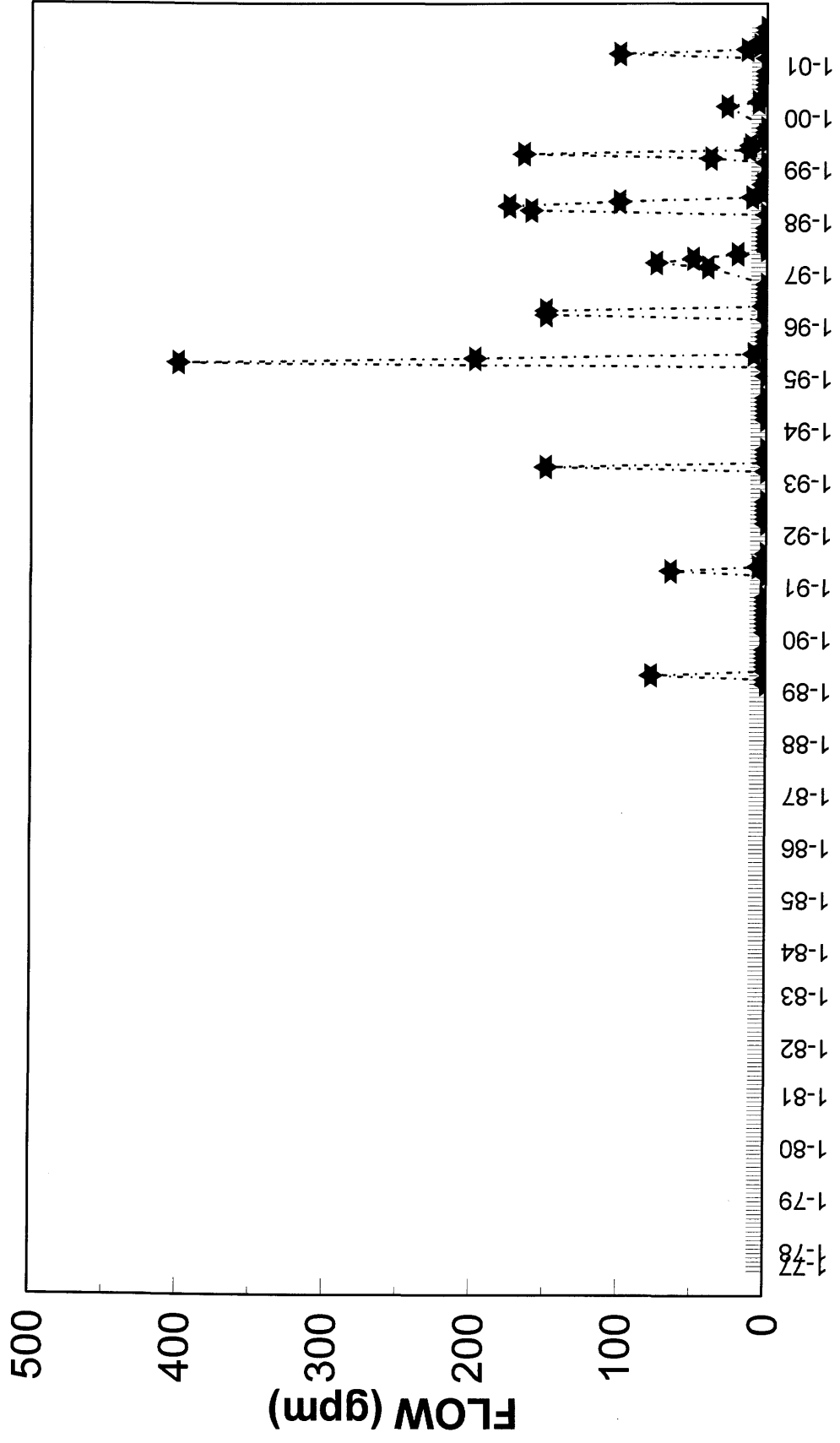
# RILDA CANYON

## RCF-1: RIGHT FORK DISCHARGE RECESSION CURVE



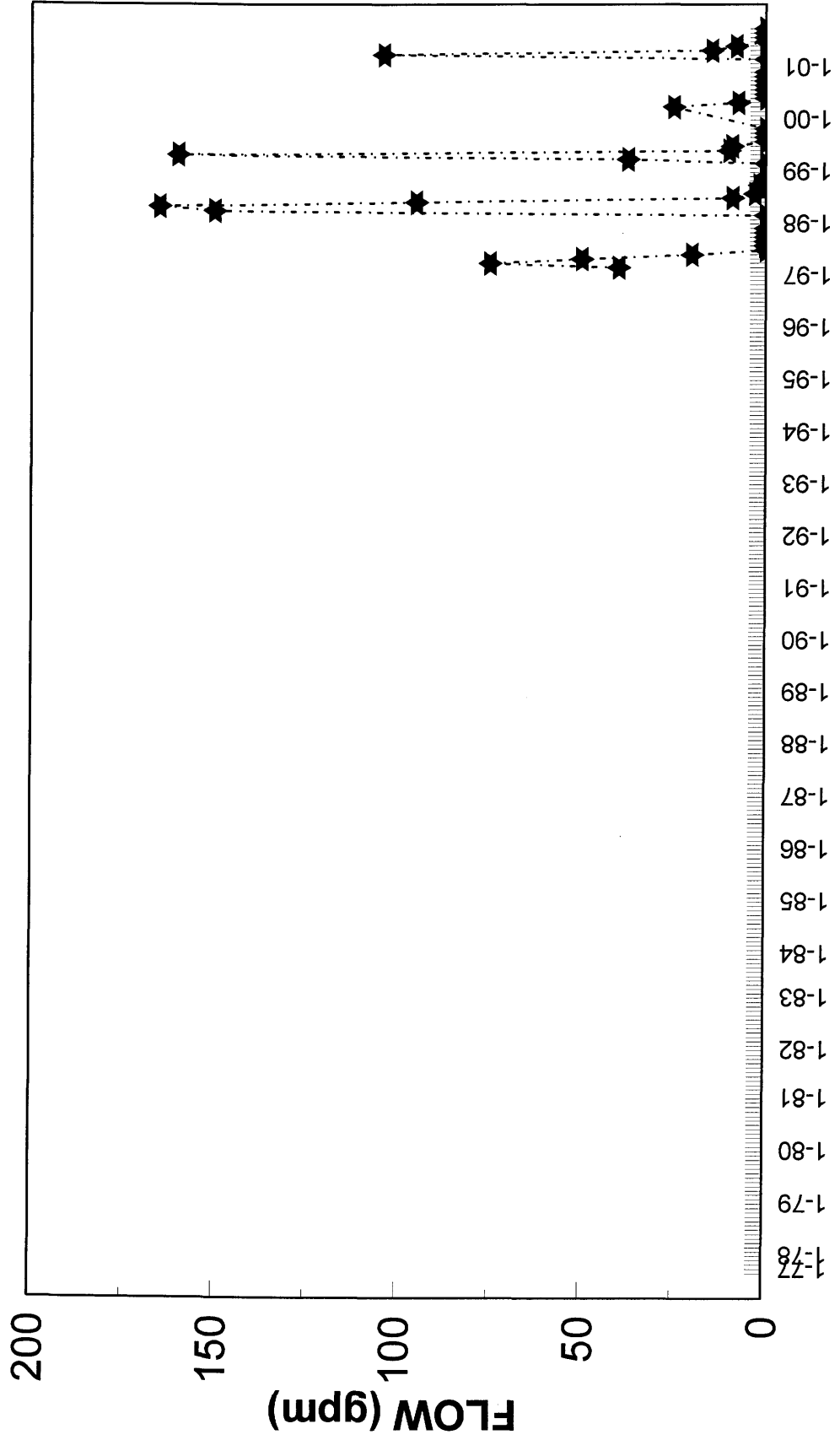
# RILDA CANYON

RCLF-1: LEFT FORK - BELOW BREAKOUTS  
DISCHARGE RECESSION CURVE



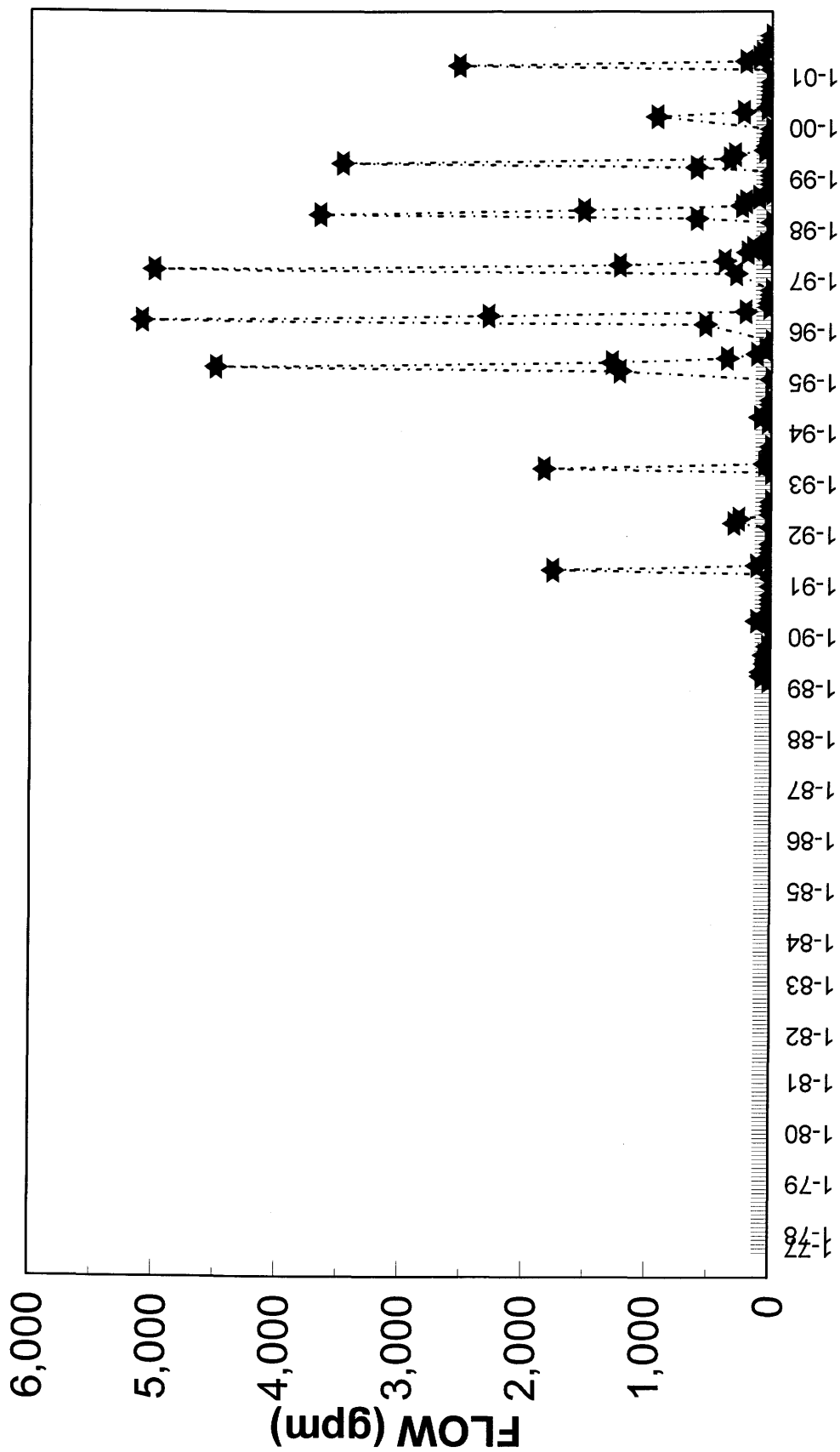
# RILDA CANYON

RCLF-2: RIGHT FORK - ABOVE BREAKOUTS  
DISCHARGE RECESSION CURVE



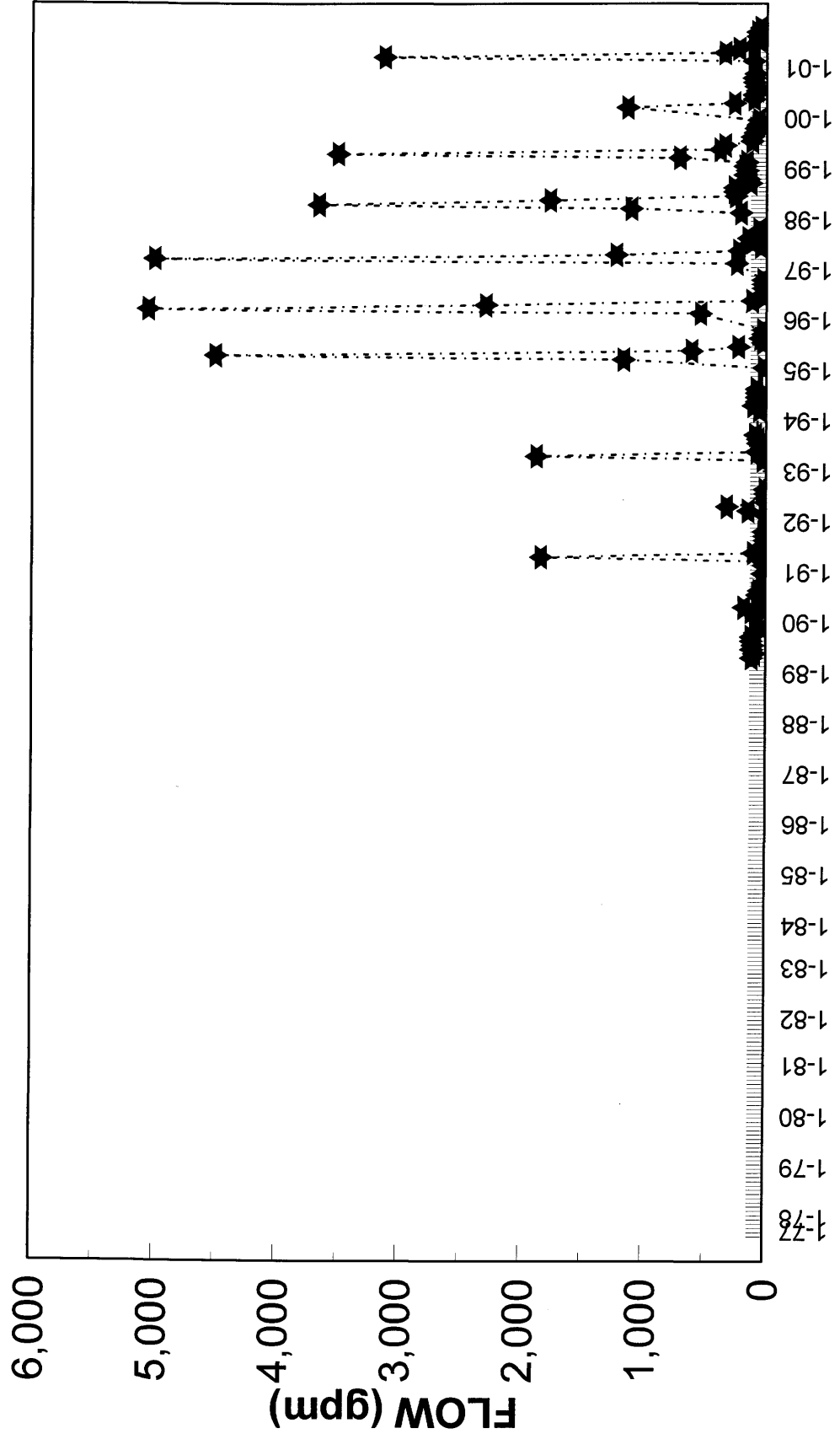
# RILDA CANYON

RCF-2: ABOVE NEWUA SPRINGS  
DISCHARGE RECESSION CURVE



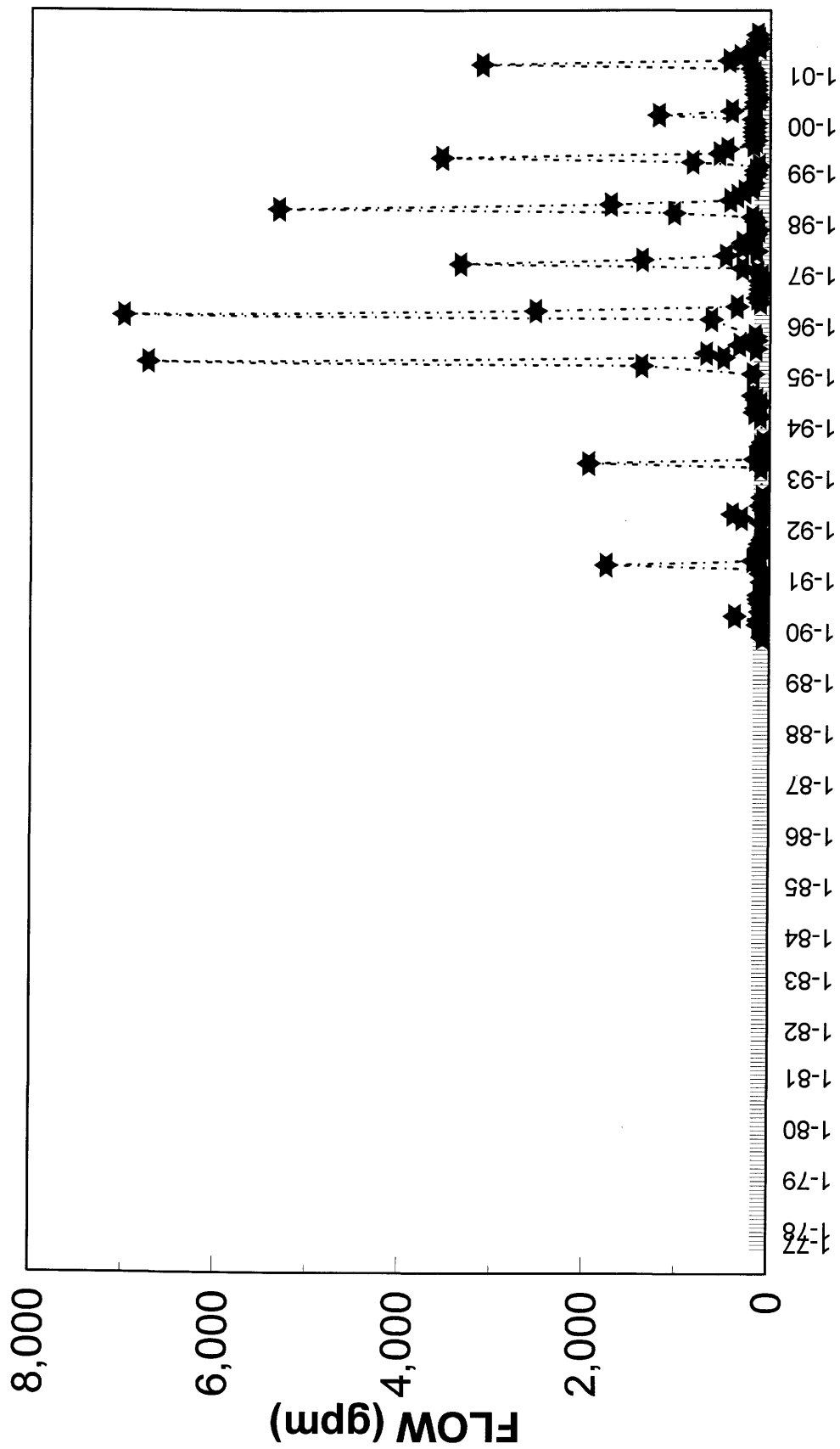
# RILDA CANYON

RCF-3: BELOW NEWUA SPRINGS  
DISCHARGE RECESSION CURVE



# RILDA CANYON

RCW-4: NEAR HUNTINGTON CANYON  
DISCHARGE RECESSION CURVE

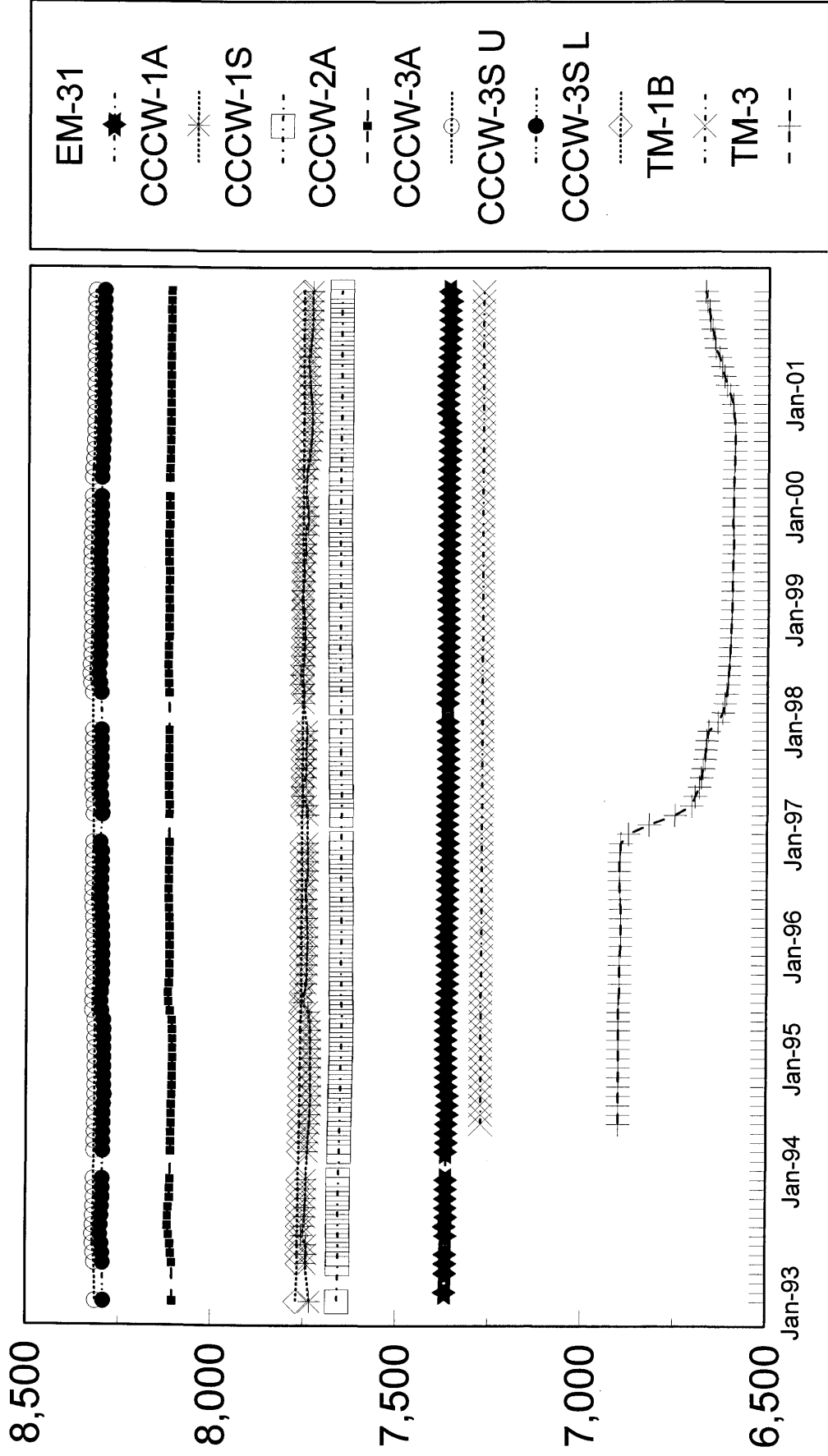


# **APPENDIX F**

## **2001**

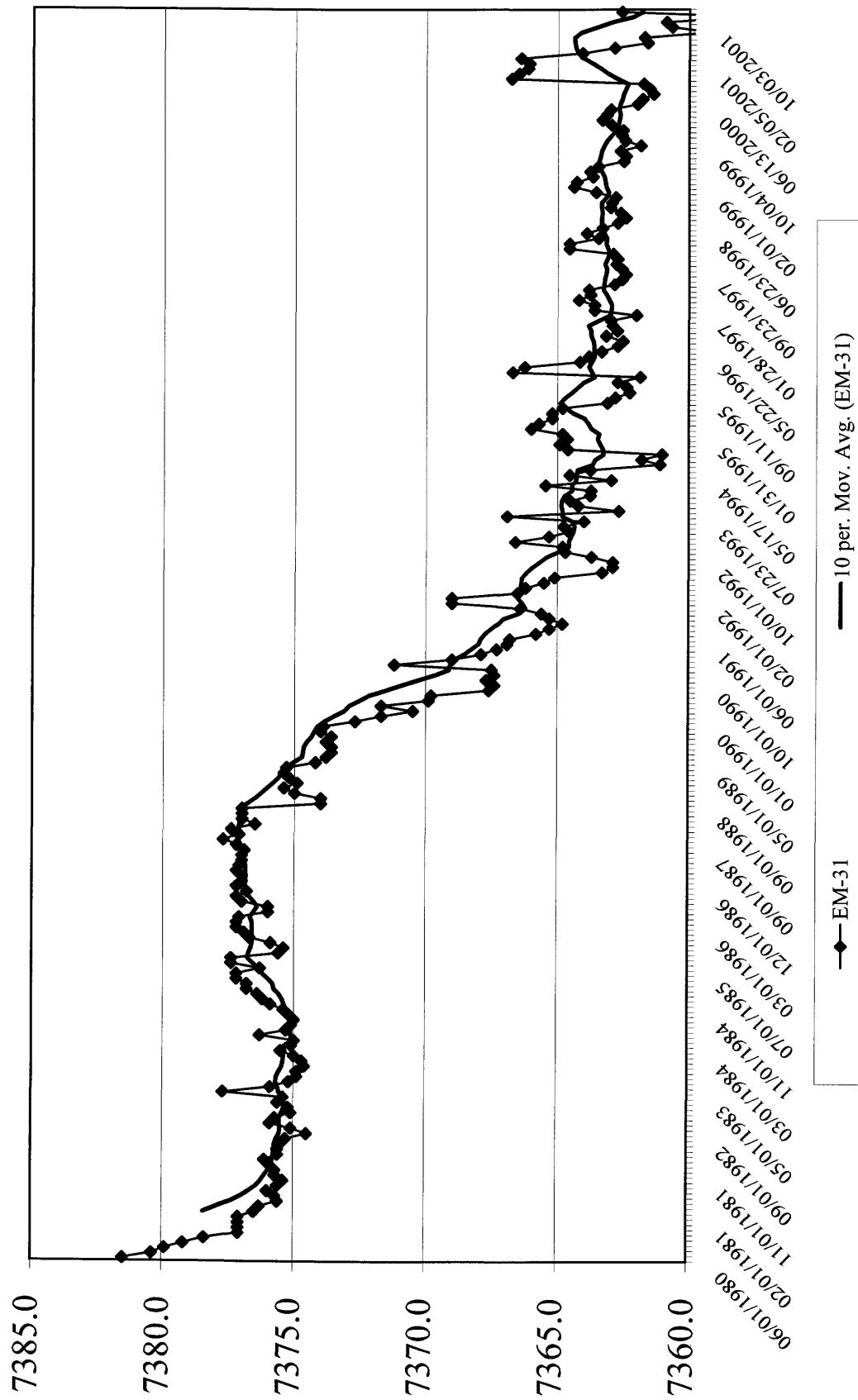
# COTTONWOOD CANYON

## MONITORING WELLS PIEZOMETRIC DATA

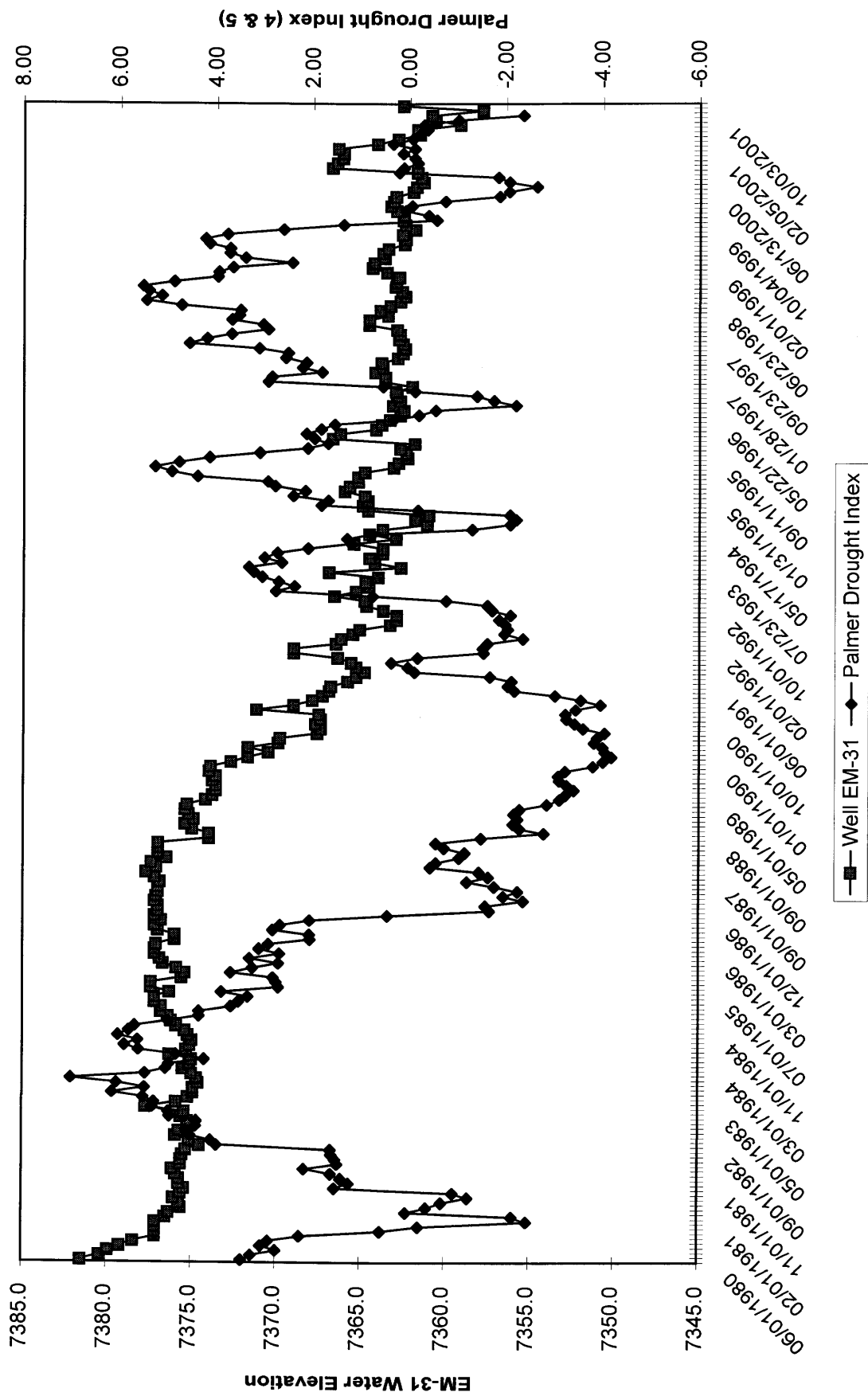




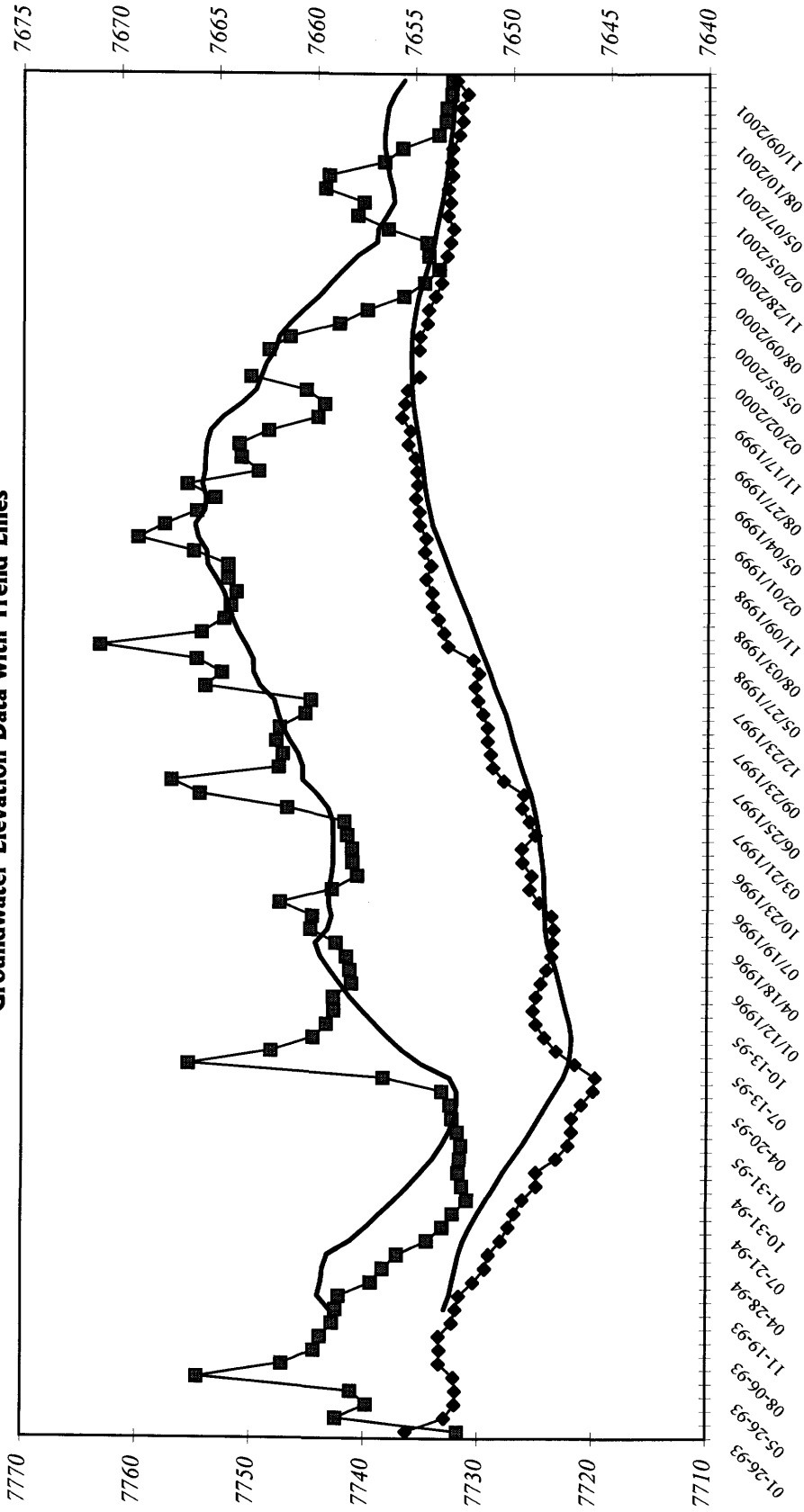
# Cottonwood Well EM-31



# EM-31 Well Elevation vs. Palmer Drought Index



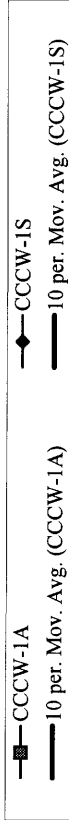
# **Cottonwood Wells - Site 1** Groundwater Elevation Data with Trend Lines



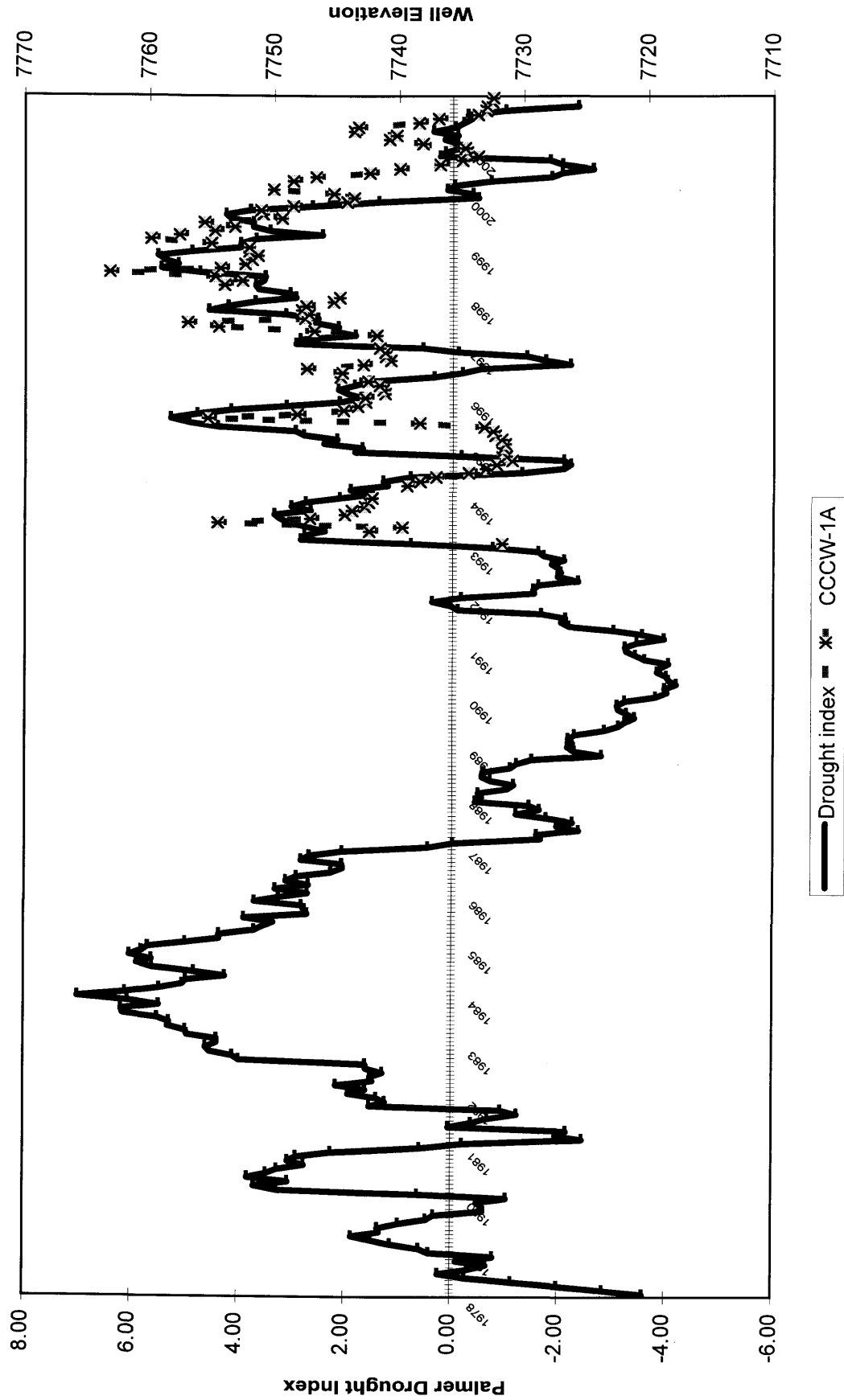
Well Elevations:  
CCCW-1A = 7843  
CCCW-1S = 7845

Star Point Formation  
Elevation = 7232

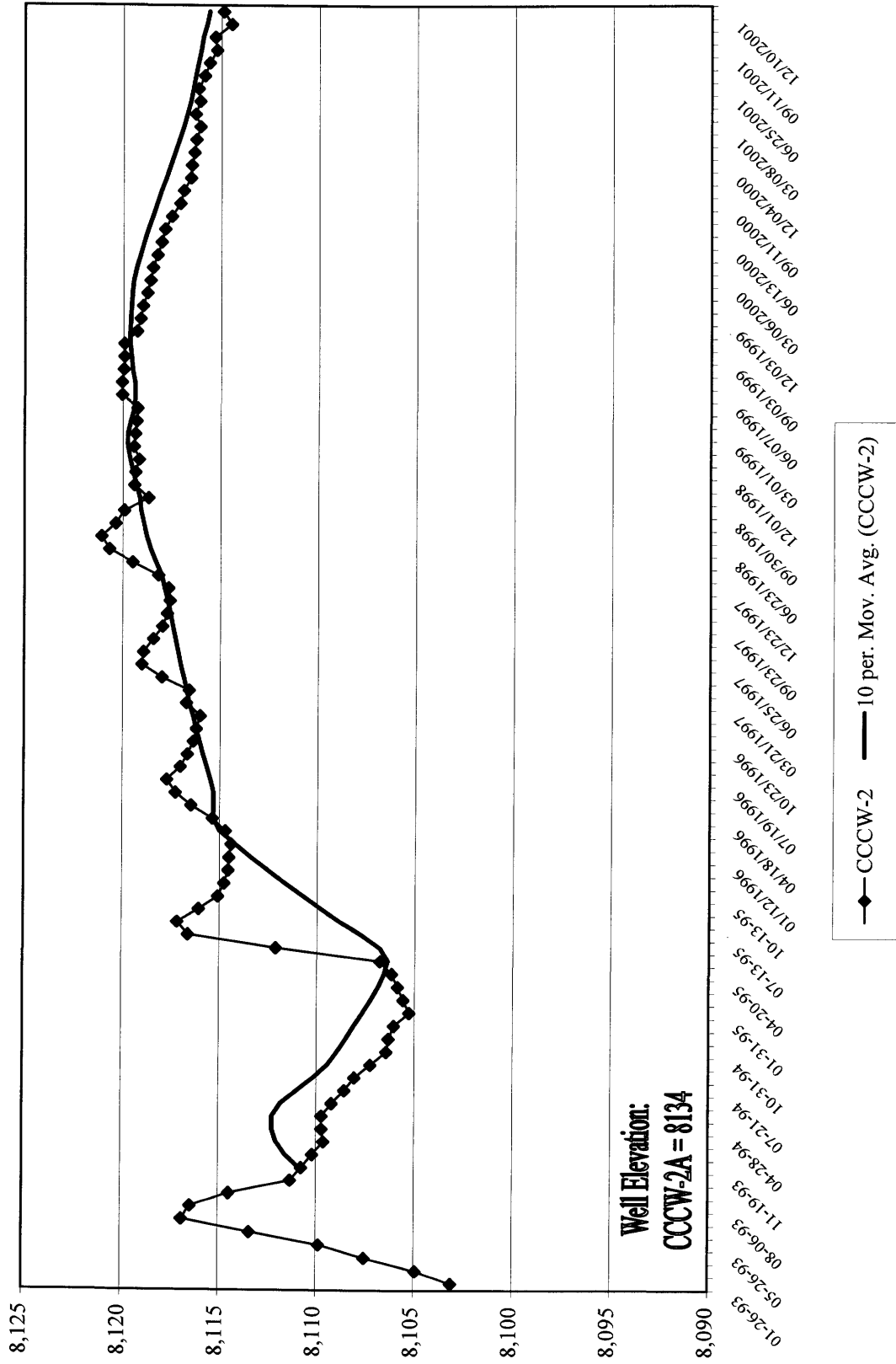
Cottonwood Spring Elevation = 7749  
Roans Canyon Spring = 7632



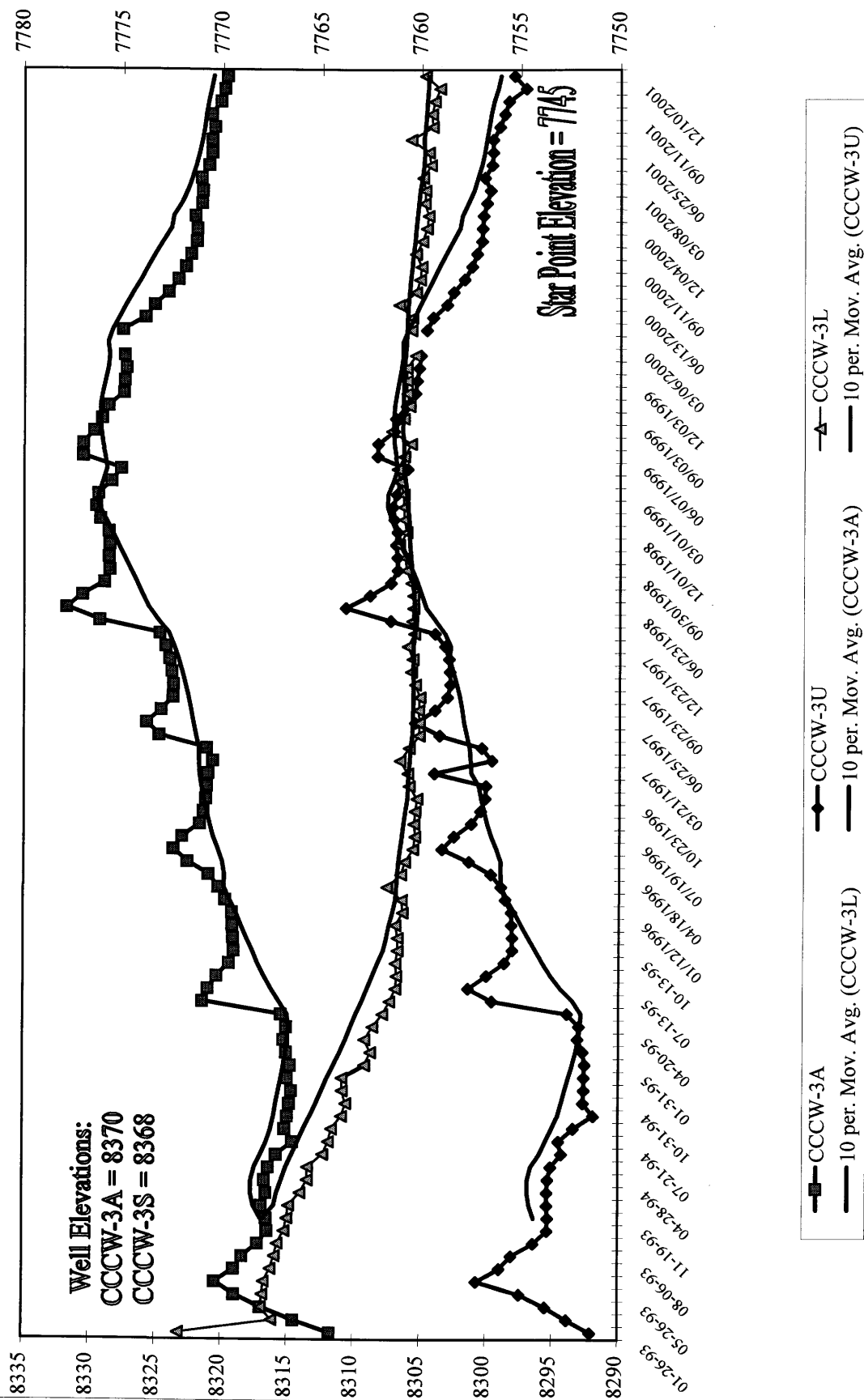
Palmer Drought Index vs. CCCW-1A Well Elevation  
(Palmer Data: Average of Regions 4 & 5)



# **Cottonwood Well 2A** **Groundwater Elevation Data with Trend Line**

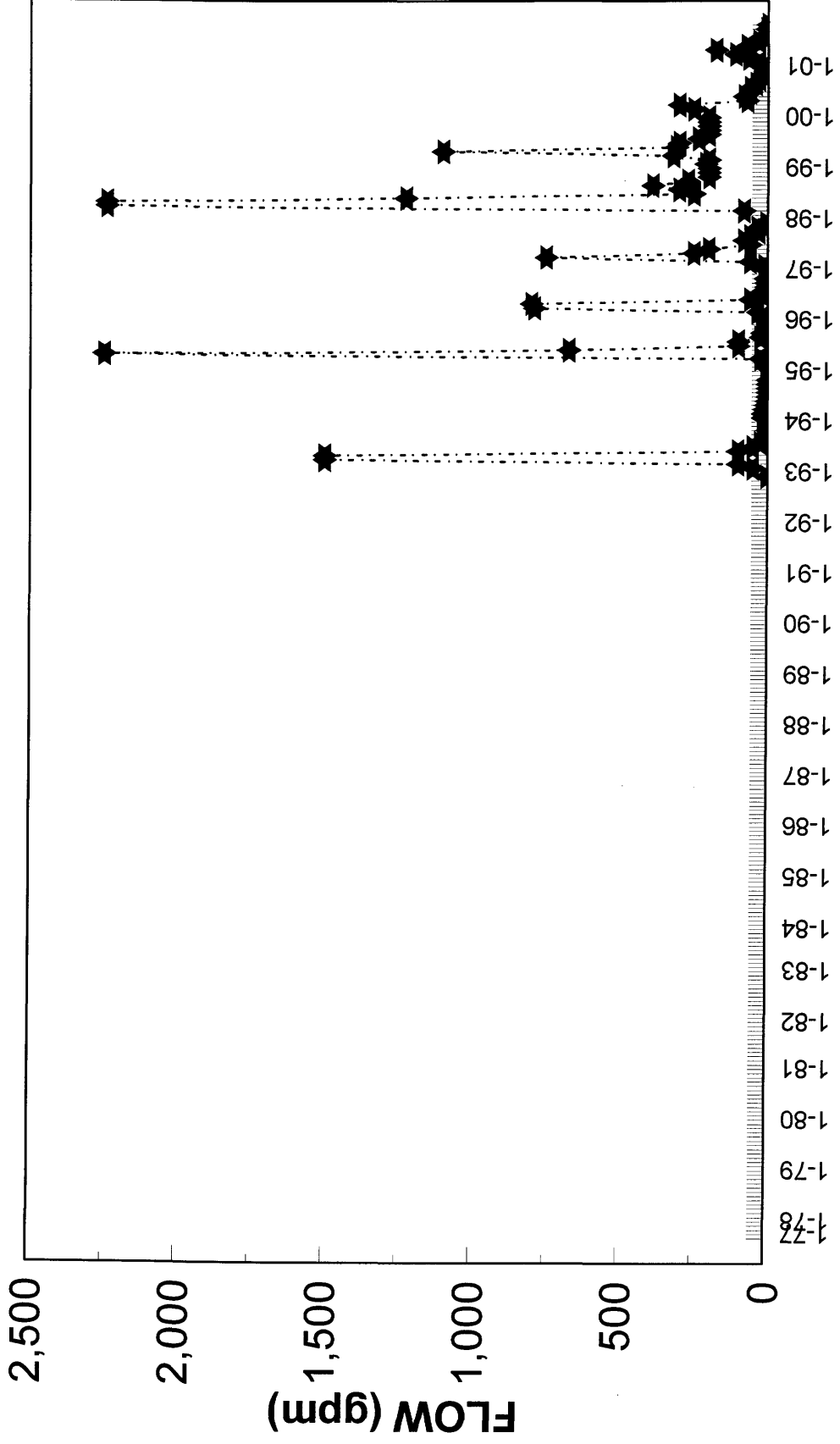


# **Cottonwood Wells - Site 3** **Groundwater Elevation Data with Trend Lines**



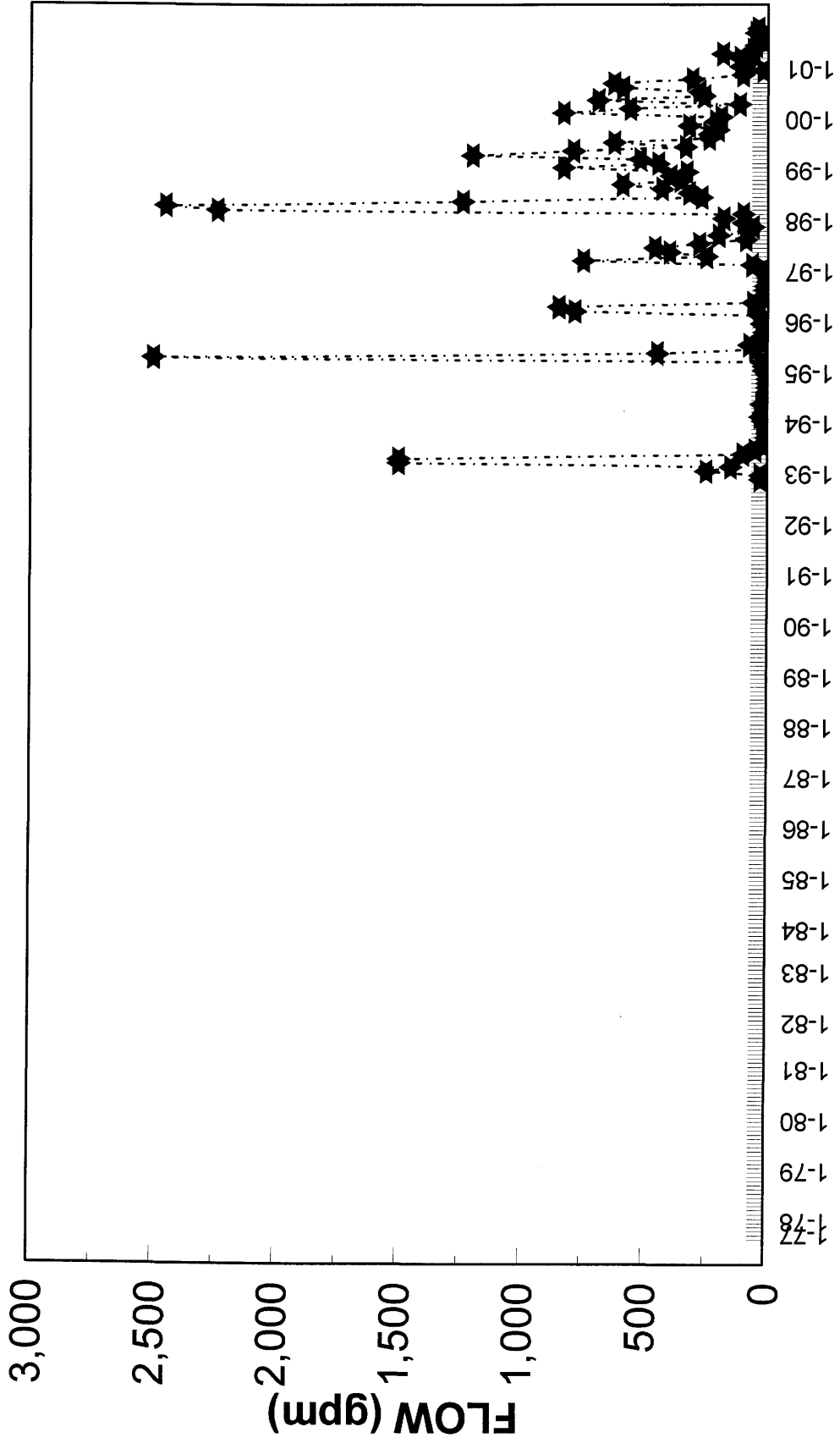
# COTTONWOOD CANYON CREEK

## SW-1 DISCHARGE RECESSION CURVE



# COTTONWOOD CANYON CREEK

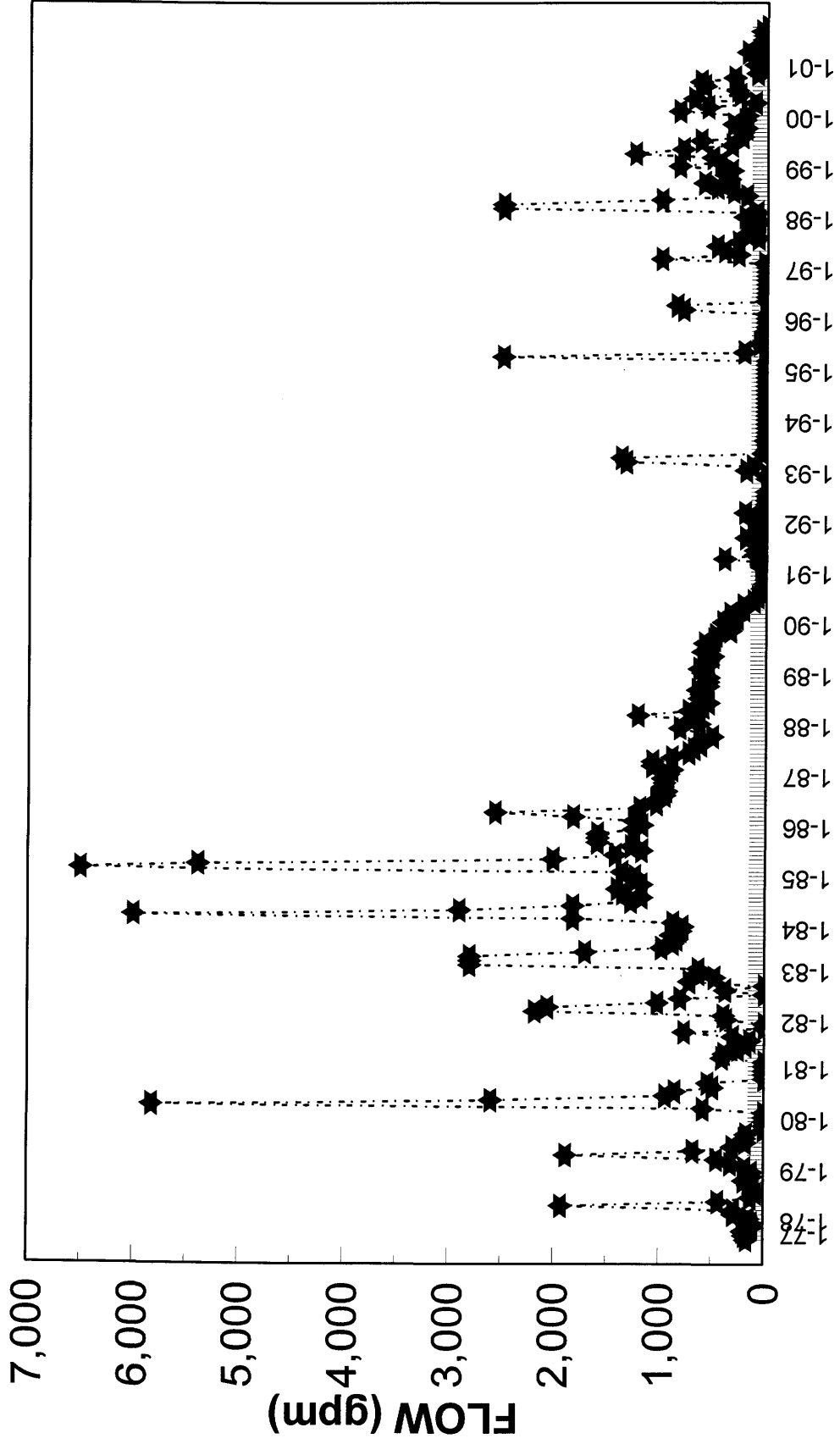
## SW-2 DISCHARGE RECESSION CURVE





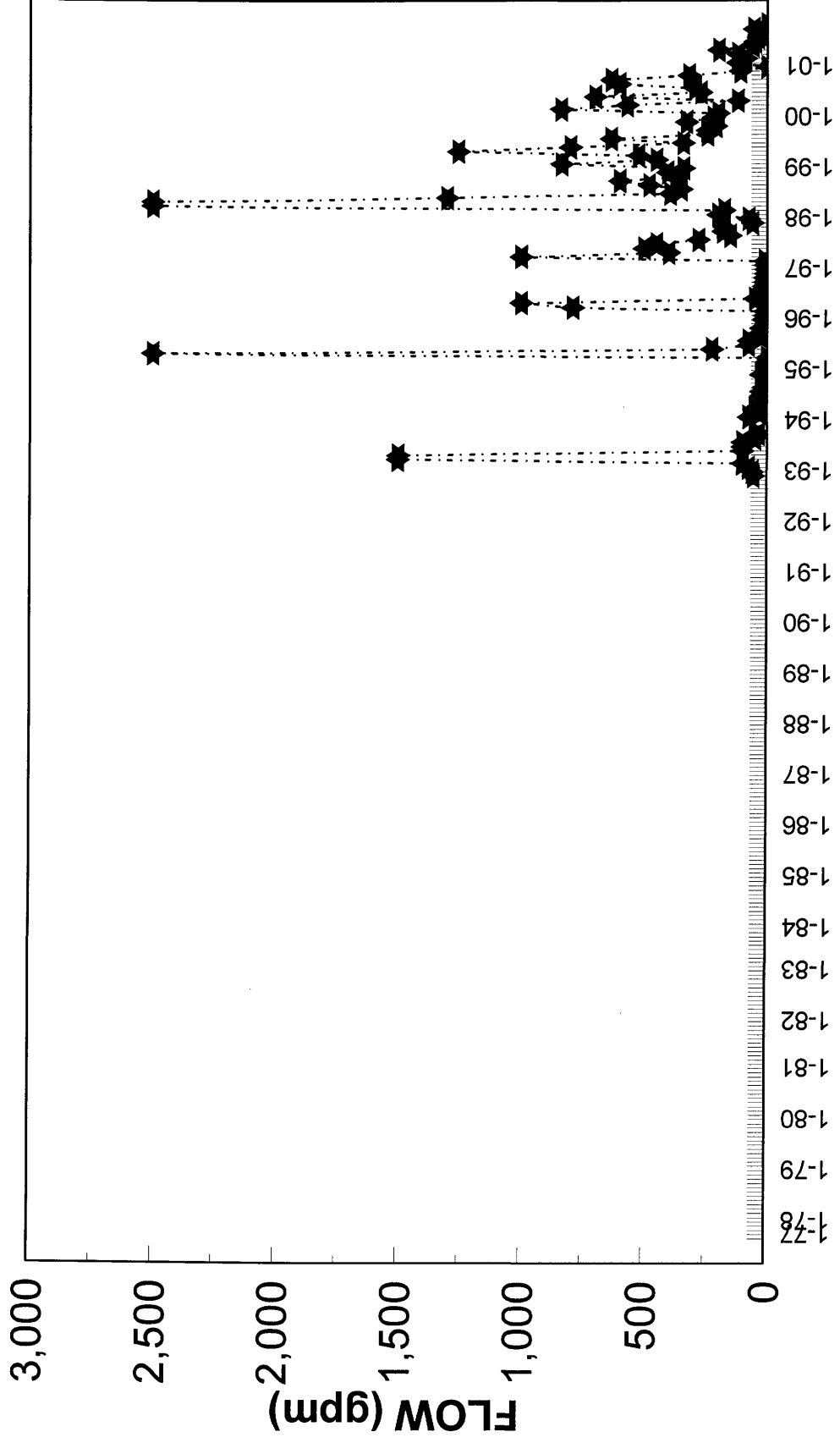
# COTTONWOOD CANYON CREEK

@ USGS FLUME  
DISCHARGE RECESSION CURVE

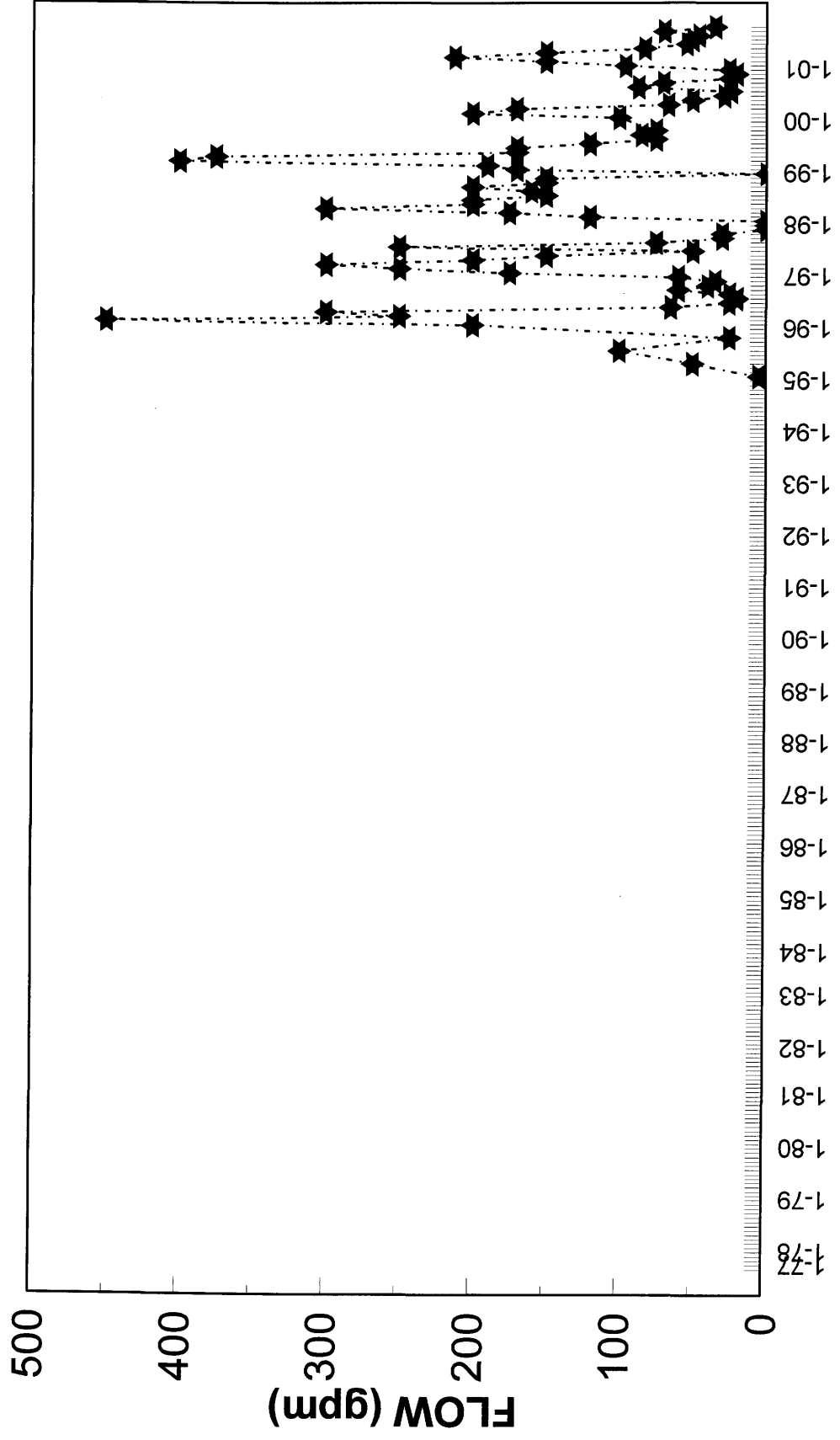


# COTTONWOOD CANYON CREEK

## SW-3 DISCHARGE RECESSION CURVE



**T-19**  
**DISCHARGE RECESSION CURVE**



## STRAIGHT CANYON WATER QUALITY \*

T-19

2001** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umh/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20010309		395	49		46	1312	410			70			8.33	3	95	285	15	742
20010606		383	46	8	34	1062	350	0.3		57			8.52	2	68	136	37	510
20010920		461	56		39.9	1399	498	2.7		87	0.1		8.55	5	85	277.8	225	784
20011211		422	57	6	32.8	1111	464			78			8.38	4	75	254.6	5	716
2001** MIN		383	46	6	33	1062	350	0.3		57			8.3	2	68	136	5	510
MAX		461	57	8	46	1399	498	2.7		87			8.6	5	95	285	225	784
MEAN		415	52	7	38	1221	431	1.5		73			8.4	4	81	238	71	688
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2009** MIN		345	42	12	42	1105	400	0		68			8	3	103	181	7	722
MAX		424	58	23	53	1319	516	3		92			9	5	109	340	309	868
MEAN		393	51	16	48	1221	454	1		80			8	4	105	266	113	792
1999** MIN		371	42	9	40	897	340	0		56			8	2	73	124	15	539
MAX		427	52	19	46	1097	640	1		72			9	4	87	196	69	684
MEAN		396	46	13	44	982	440	0		61			9	3	80	161	36	607
1998** MIN		317	36.0	11.0	30.0	780	275	0.30		45.00			8.19	2.00	52.00	84.0	27.0	464
MAX		433	54.0	30.0	41.0	979	993	1.30		67.00			8.64	3.00	86.00	144.0	317.0	631
MEAN		356	42.7	20.5	35.0	851	560	0.67		53.33			8.48	2.50	64.67	105.7	132.7	529
1997** MIN		303	34	6	20	596	241	0		38			8	1	34	53	36	340
MAX		420	48	9	35	912	350	2		56			9	1	62	125	321	540
MEAN		352	41	8	29	756	284	1		45			9	1	48	83	132	443
1996** MIN		190	39	34	22	631	299	0		43	0		8	2	37	50	40	388
MAX		437	74	78	30	776	406	4		54	0		9	3	54	84	269	500
MEAN		303	53	56	26	685	331	1		48	0		9	2	45	65	122	427
1995 MIN	10.00	275.00	50.00	10.00	21.00	614.00	300.00	0.50	0.10	41.00	0.10	5.00	7.99	1.00	34.00	39.00	35.0	360
MAX	10.00	340.00	60.00	20.00	41.00	1062.00	430.00	1.20	0.10	70.00	0.10	5.00	8.87	4.00	84.00	160.00	115.0	680
MEAN	10.00	312.50	55.00	17.50	28.00	821.30	366.50	0.80	0.10	55.80	0.10	5.00	8.40	2.30	53.50	94.80	63.8	515

## HISTORICAL 1977-2000

MIN	0.1	190	14.3	1.0	20.0	581	178	0.05	0.03	24.00	0.01	1.0	7.44	0.70	12	39.0	1.0	340
MAX	10.0	437	92.0	78.0	67.9	1380	993	5.10	0.38	92.00	0.20	5.0	8.87	30.20	125	336.0	420.0	910
MEAN	6.3	354	46.0	16.7	38.2	917	379	0.77	0.16	58.80	0.06	4.0	8.41	3.43	72.30	152.6	85.5	568
No. of Analysis	12	45	45	30	45	41	45	38	13	45	18	11	44	43	45	45	38	45

\* Quality parameters are reported as mg/l unless otherwise noted.

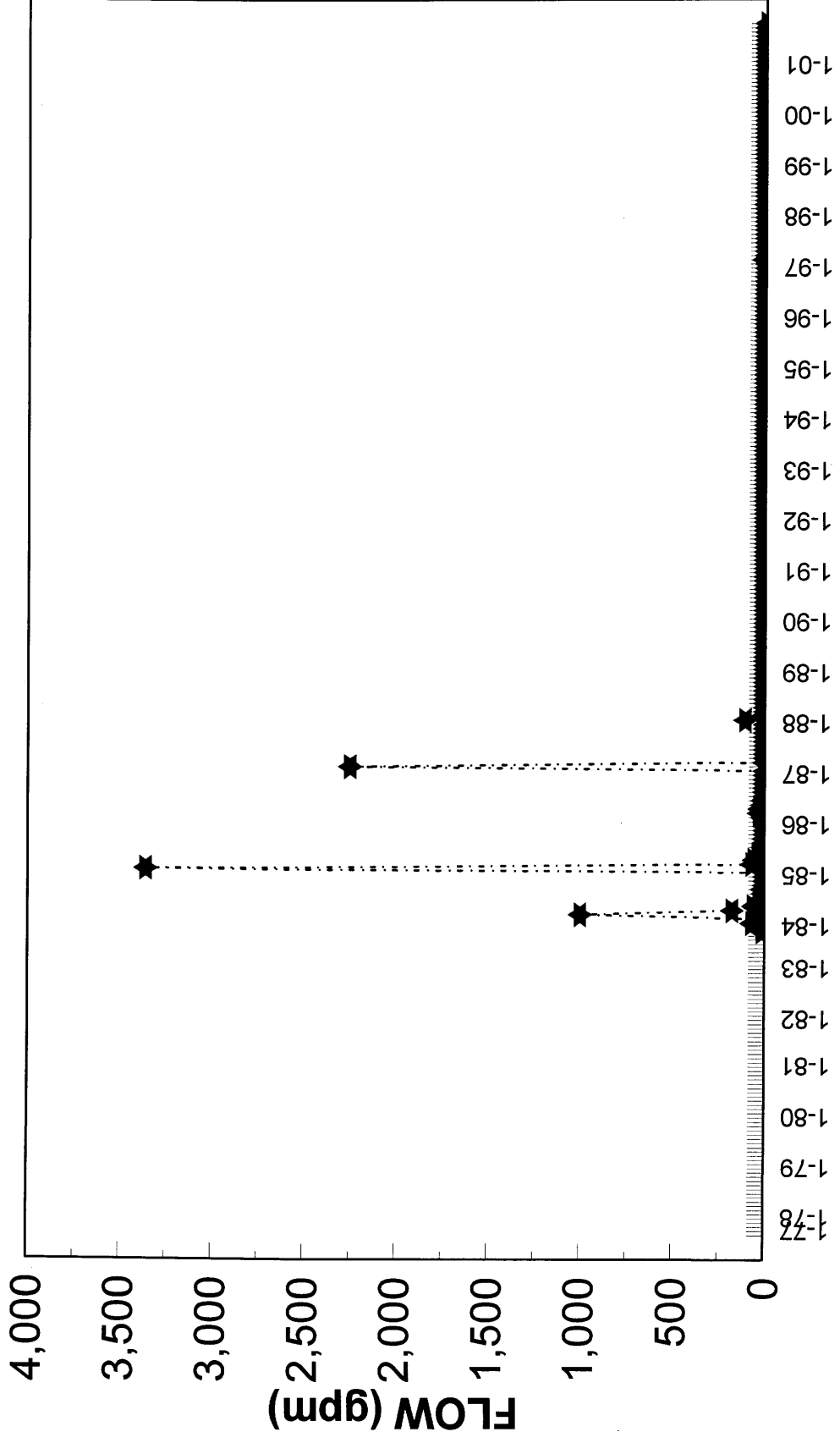
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

# **APPENDIX G**

## **2001**

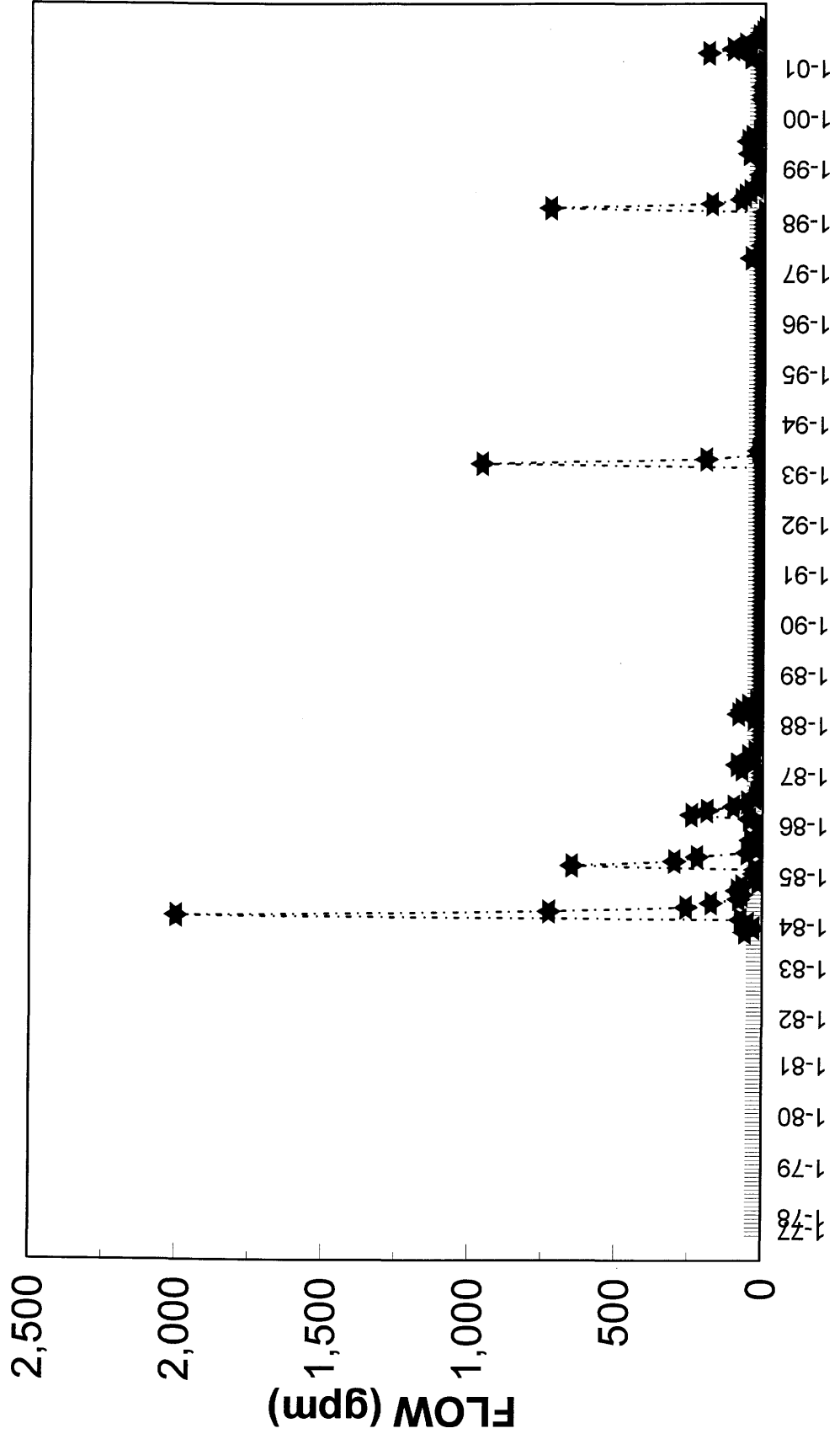
# GRIMES WASH

## RIGHT FORK DISCHARGE RECESSION CURVE



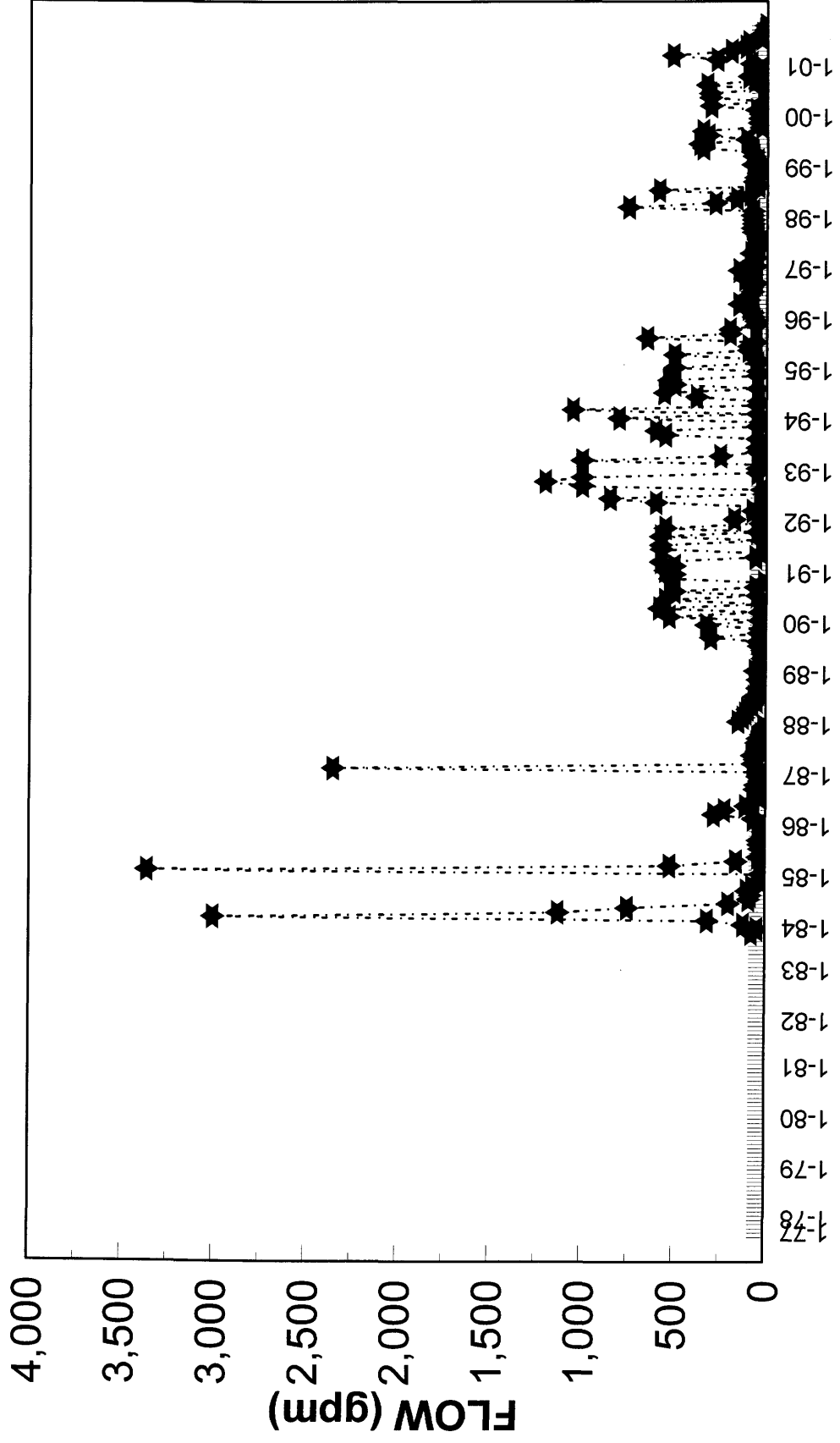
# GRIMES WASH

## LEFT FORK DISCHARGE RECESSION CURVE



# GRIMES WASH

## BELOW MINE DISCHARGE RECESSION CURVE





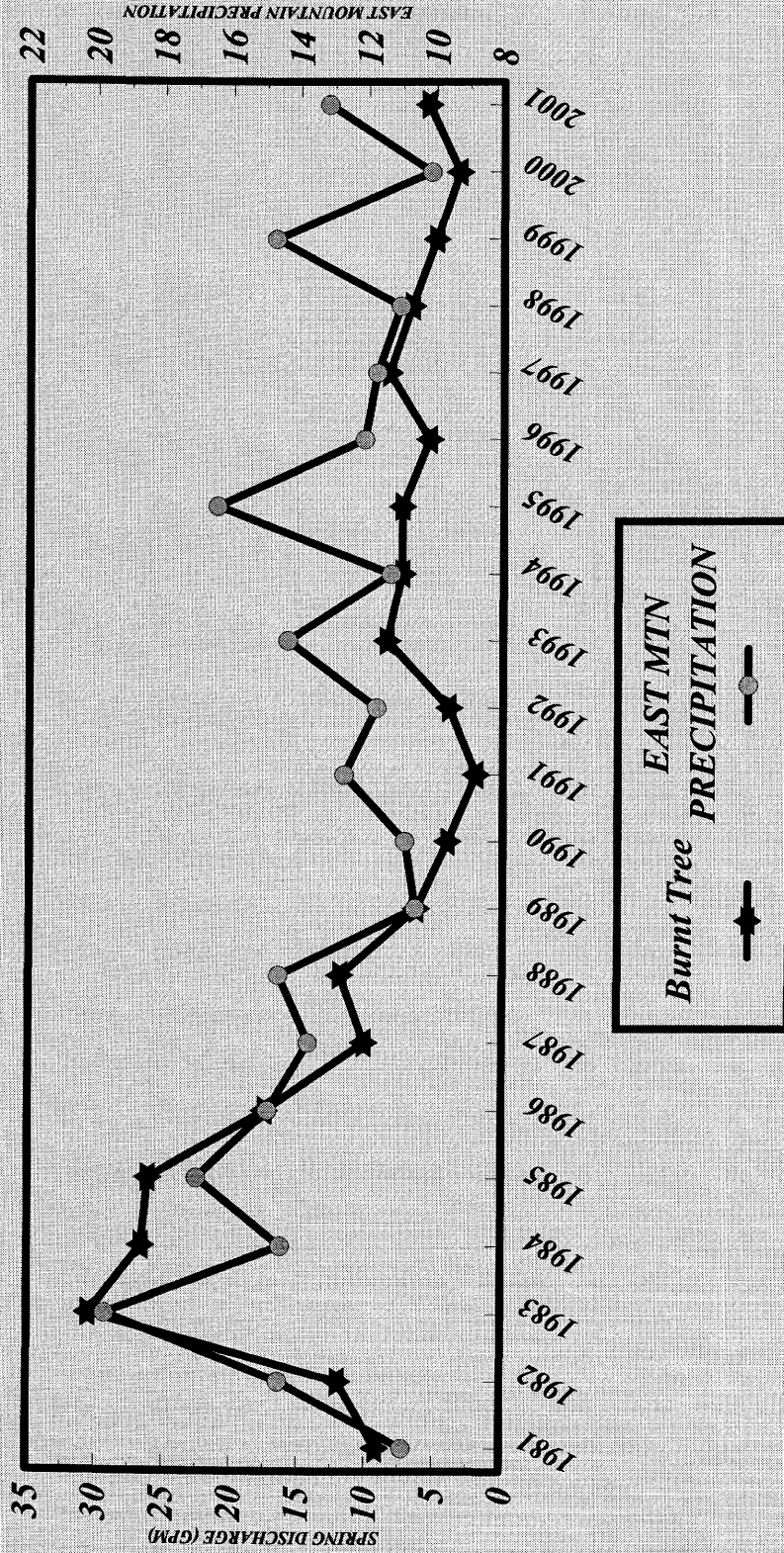
# APPENDIX H

# 2001

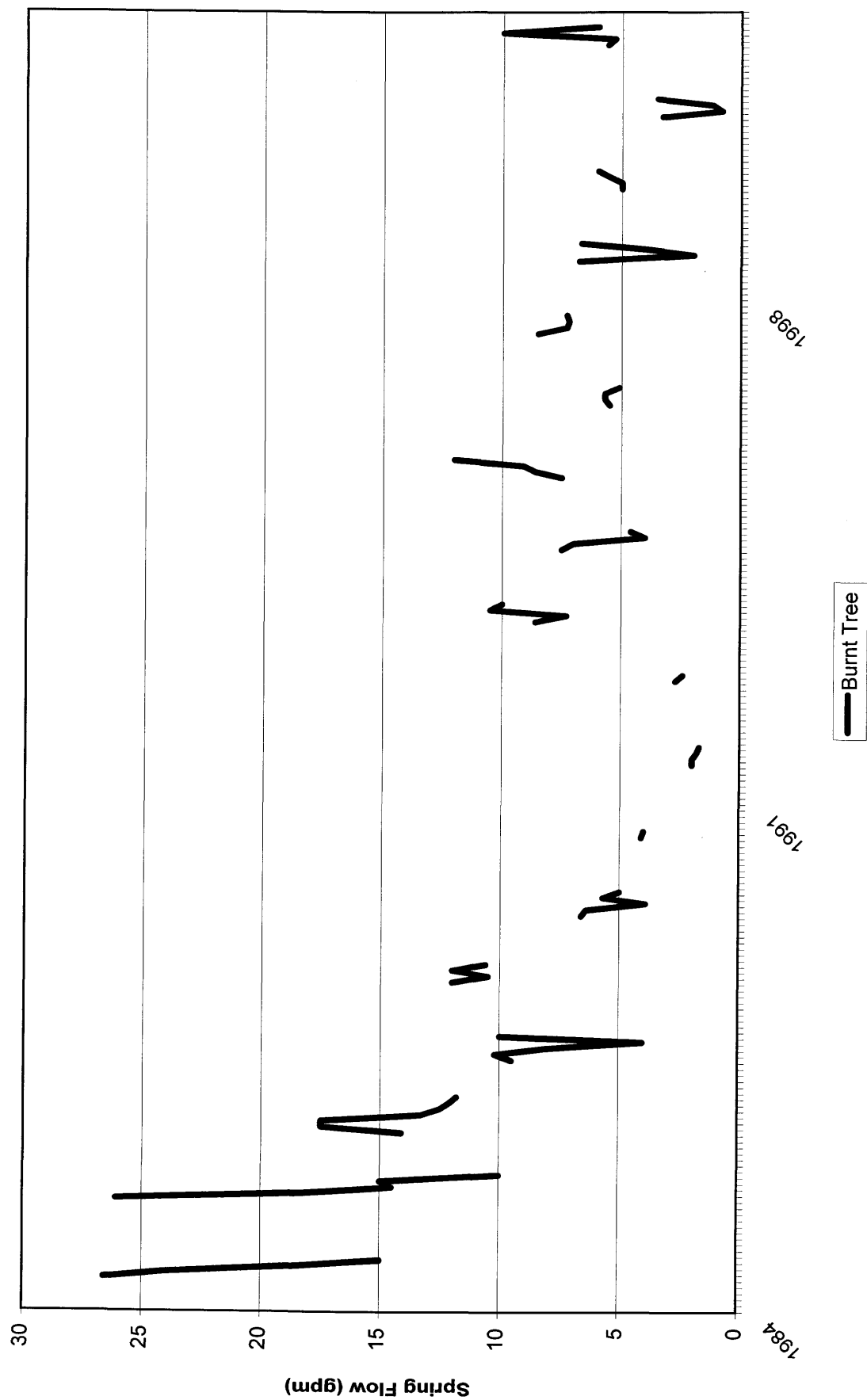
# EAST MOUNTAIN SPRINGS

## Spring: Burnt Tree vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



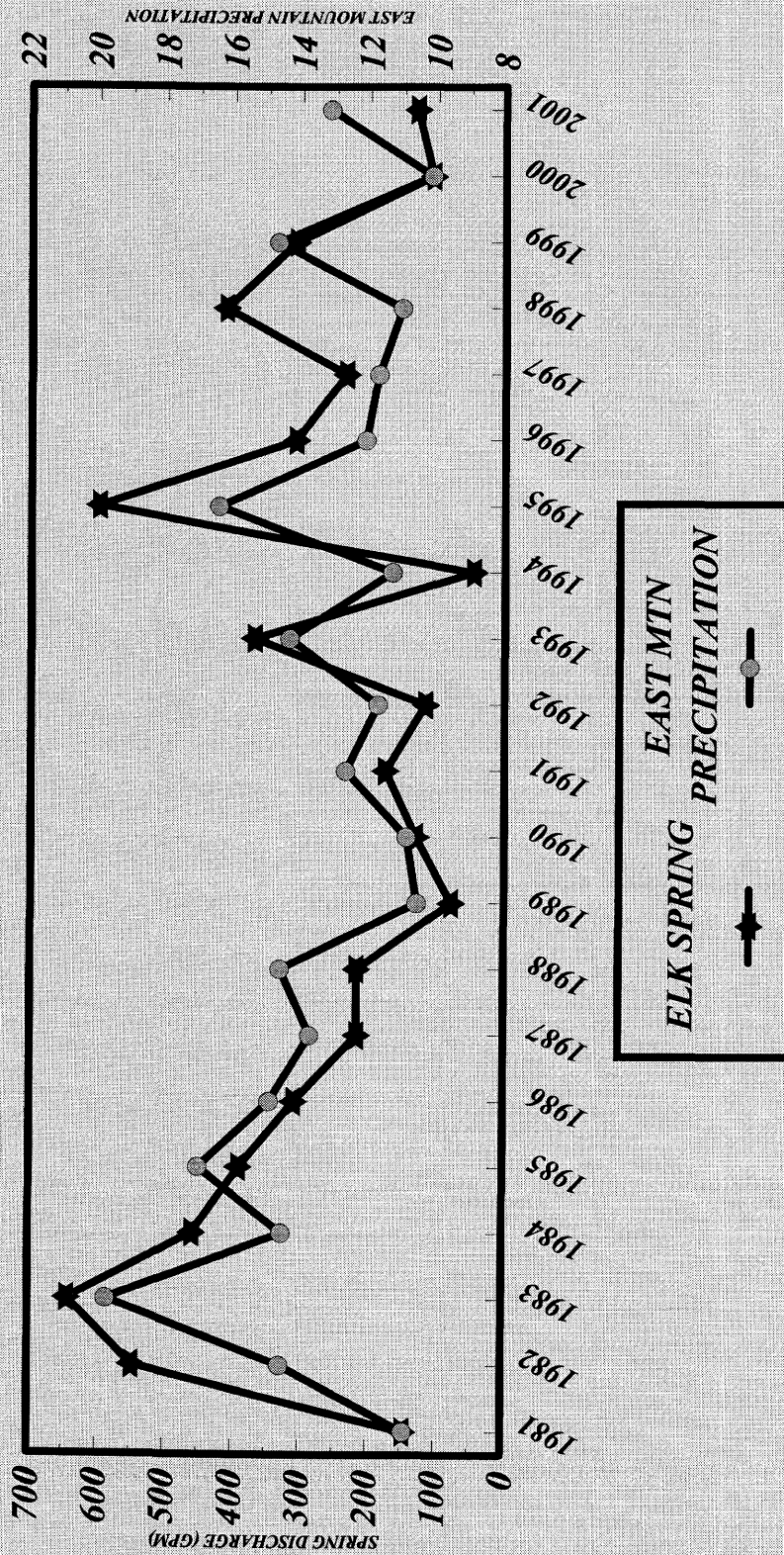
# East Mountain Springs Burnt Tree



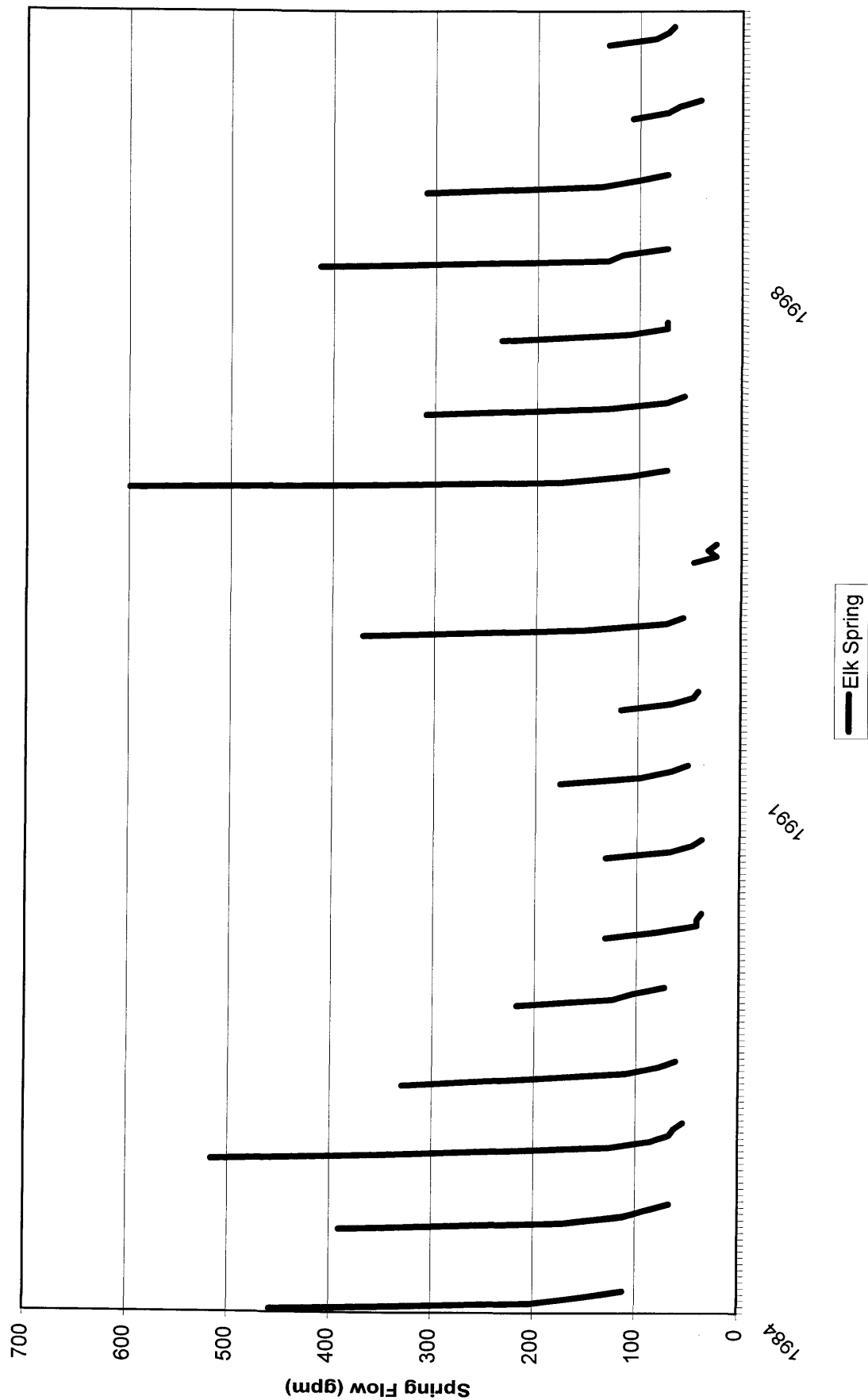
# EAST MOUNTAIN SPRINGS

## Spring: Elk Spring vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# East Mountain Springs Elk Spring

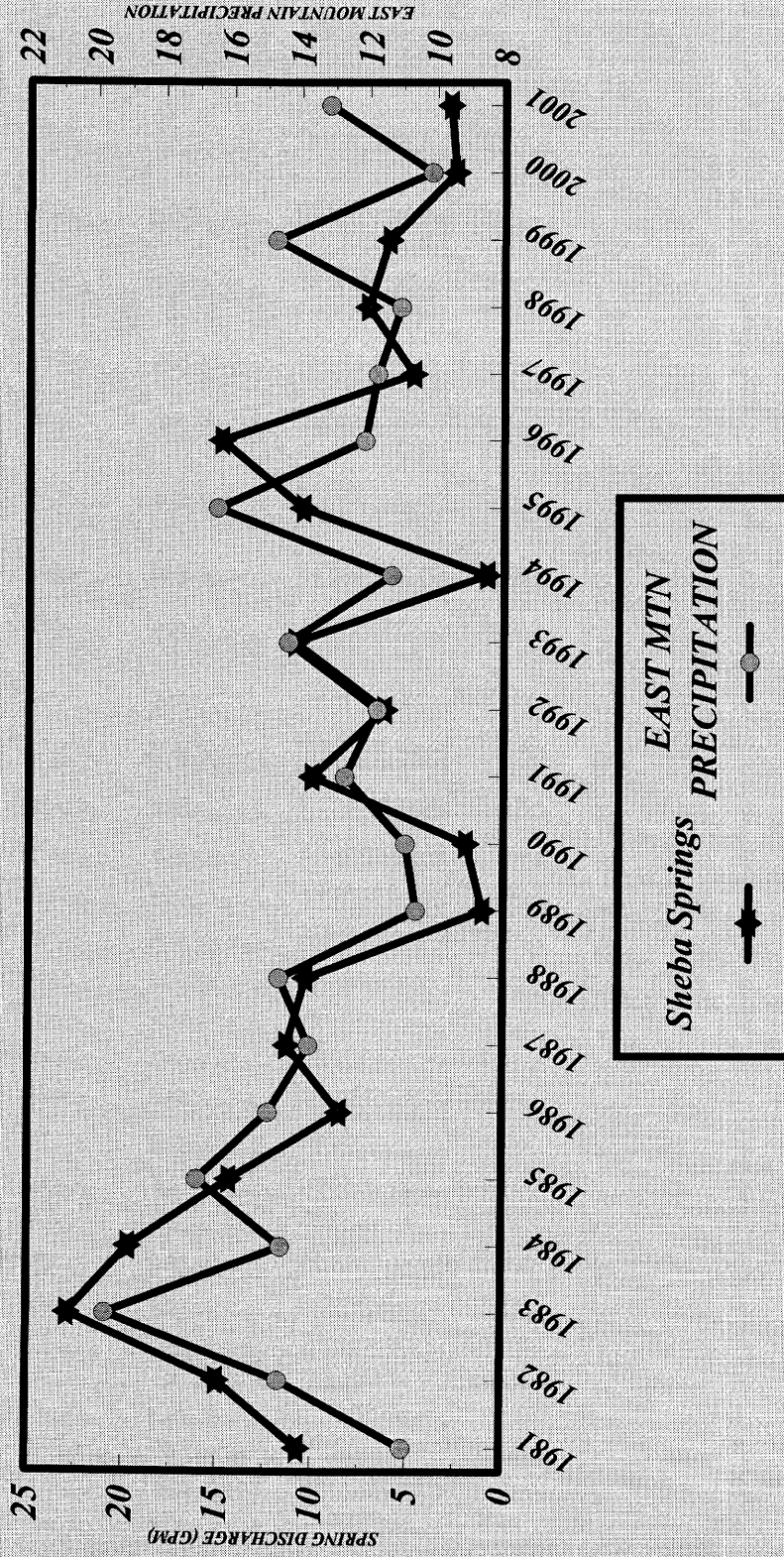




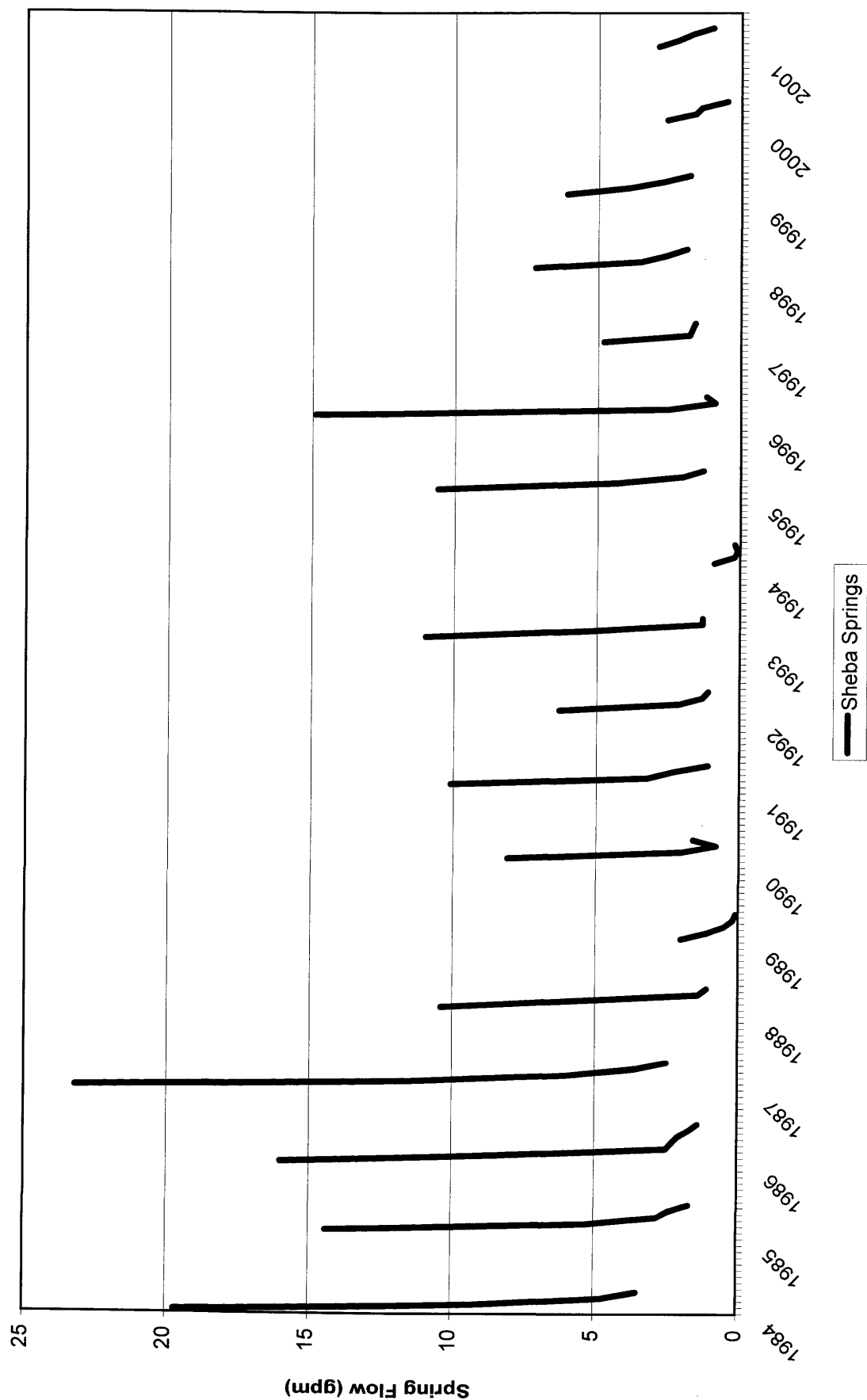
# EAST MOUNTAIN SPRINGS

## Spring: Sheba Springs vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



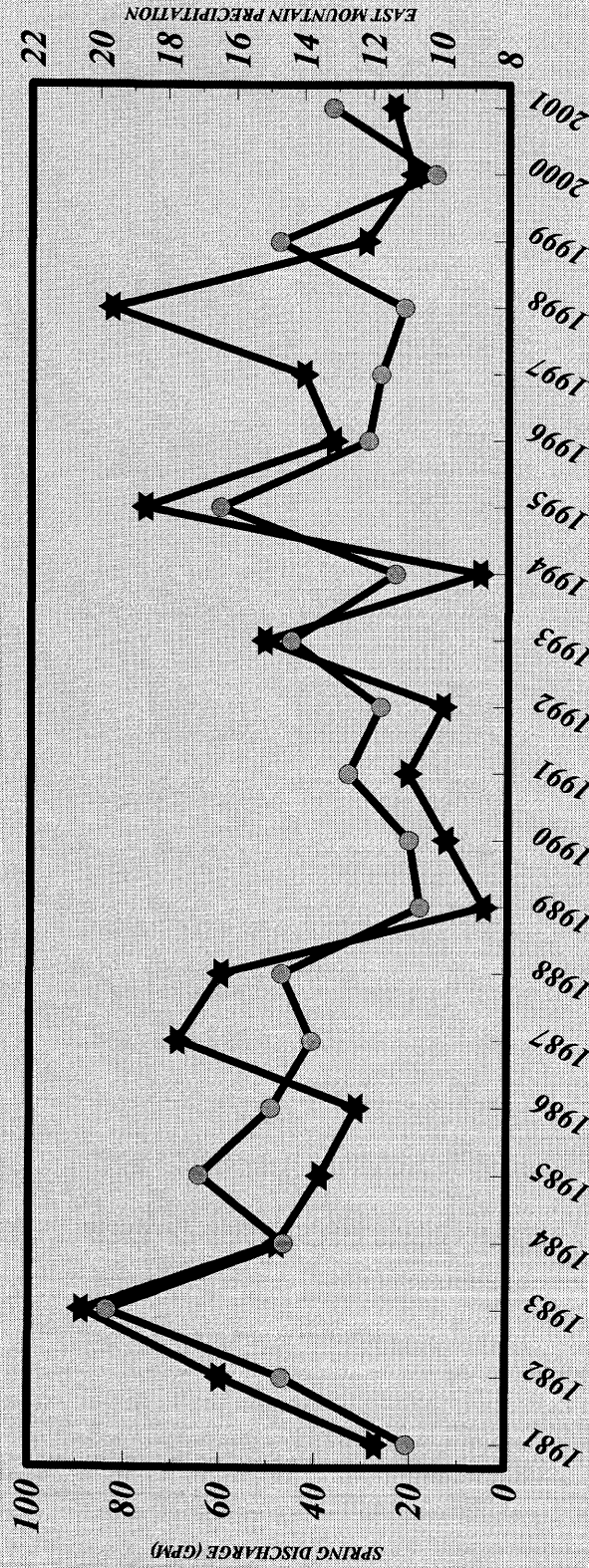
# East Mountain Springs Sheba Springs



# EAST MOUNTAIN SPRINGS

## Spring: Teds Tub vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

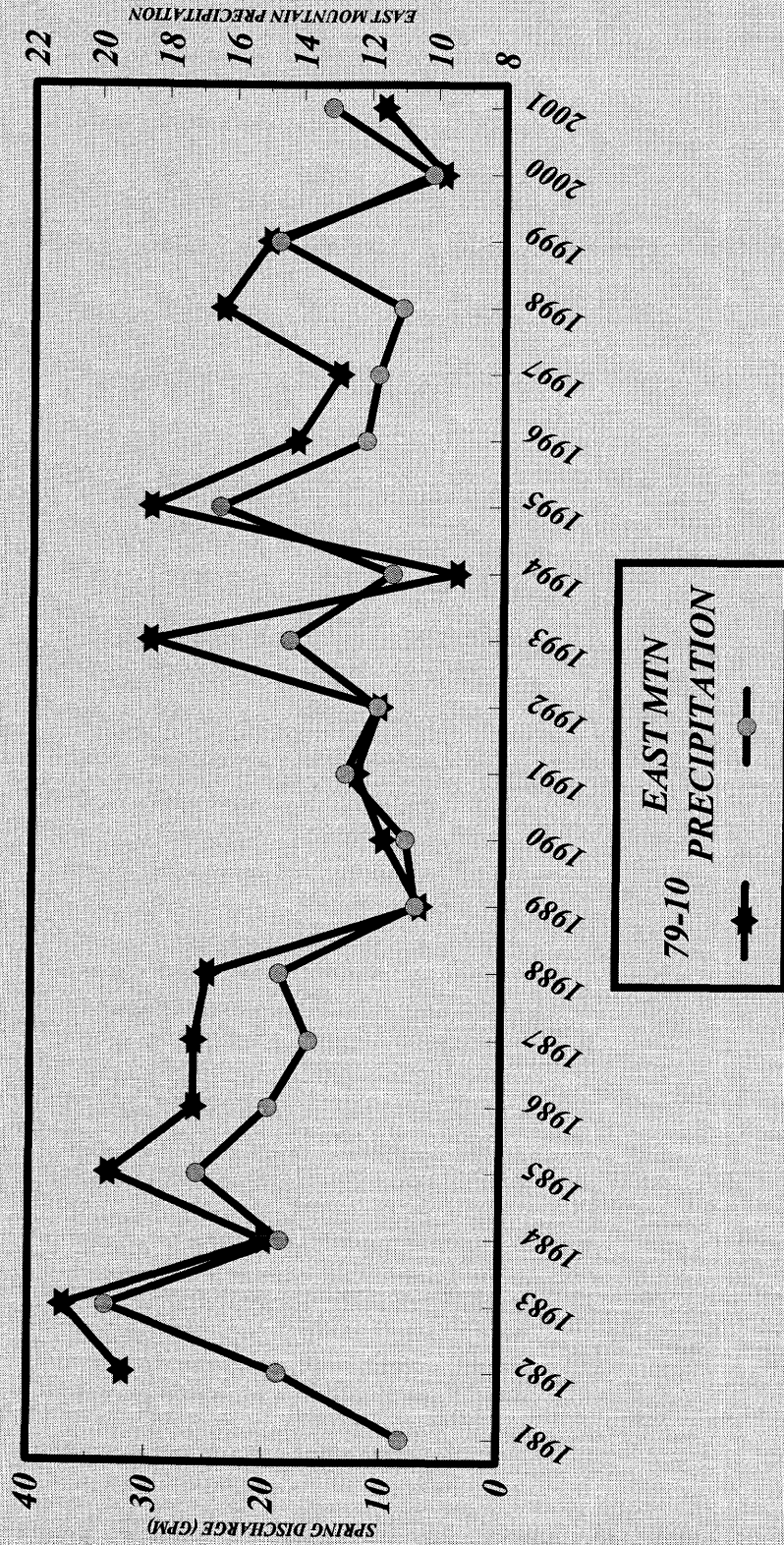




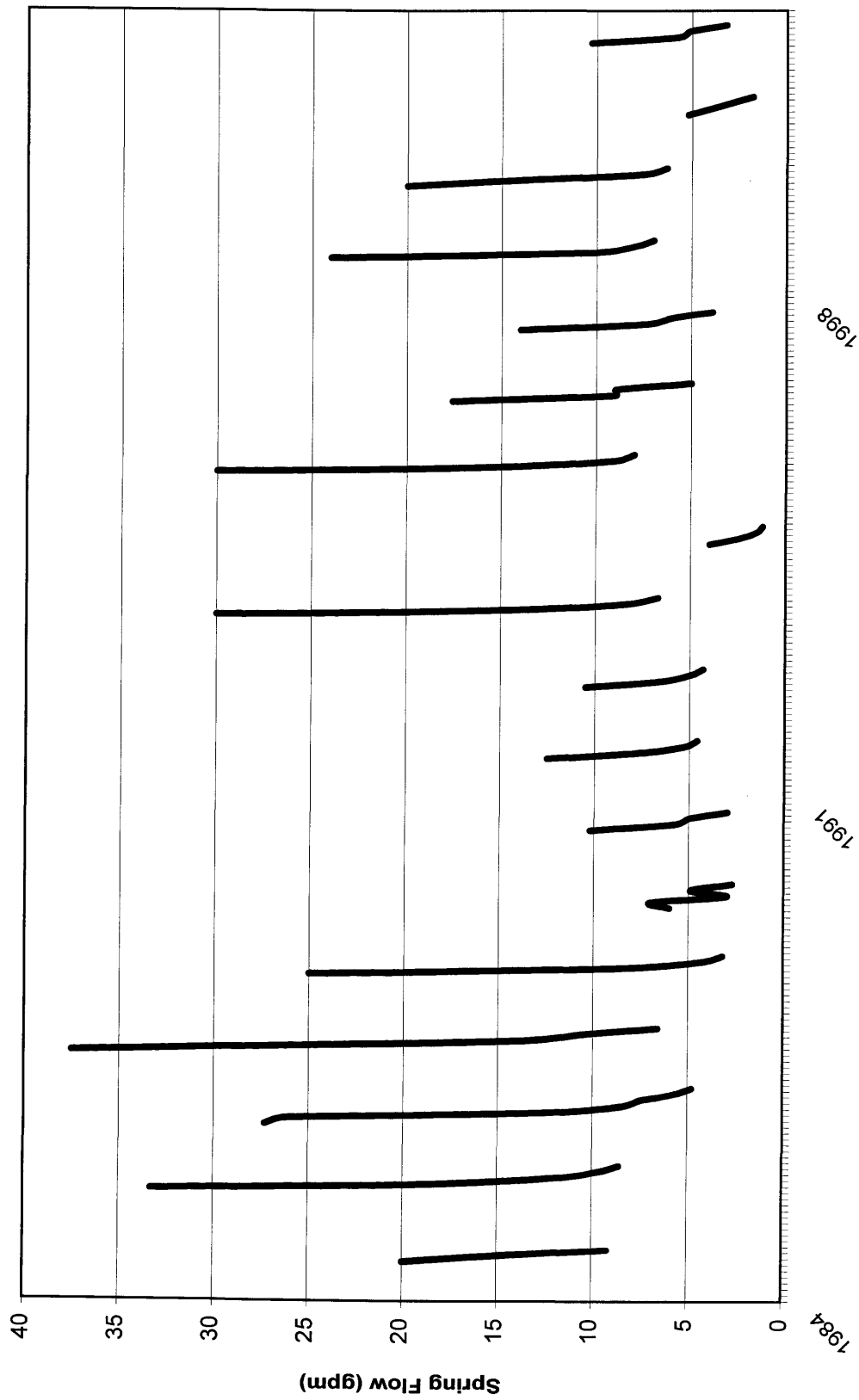
# EAST MOUNTAIN SPRINGS

## Spring: 79-10 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# East Mountain Springs 79-10

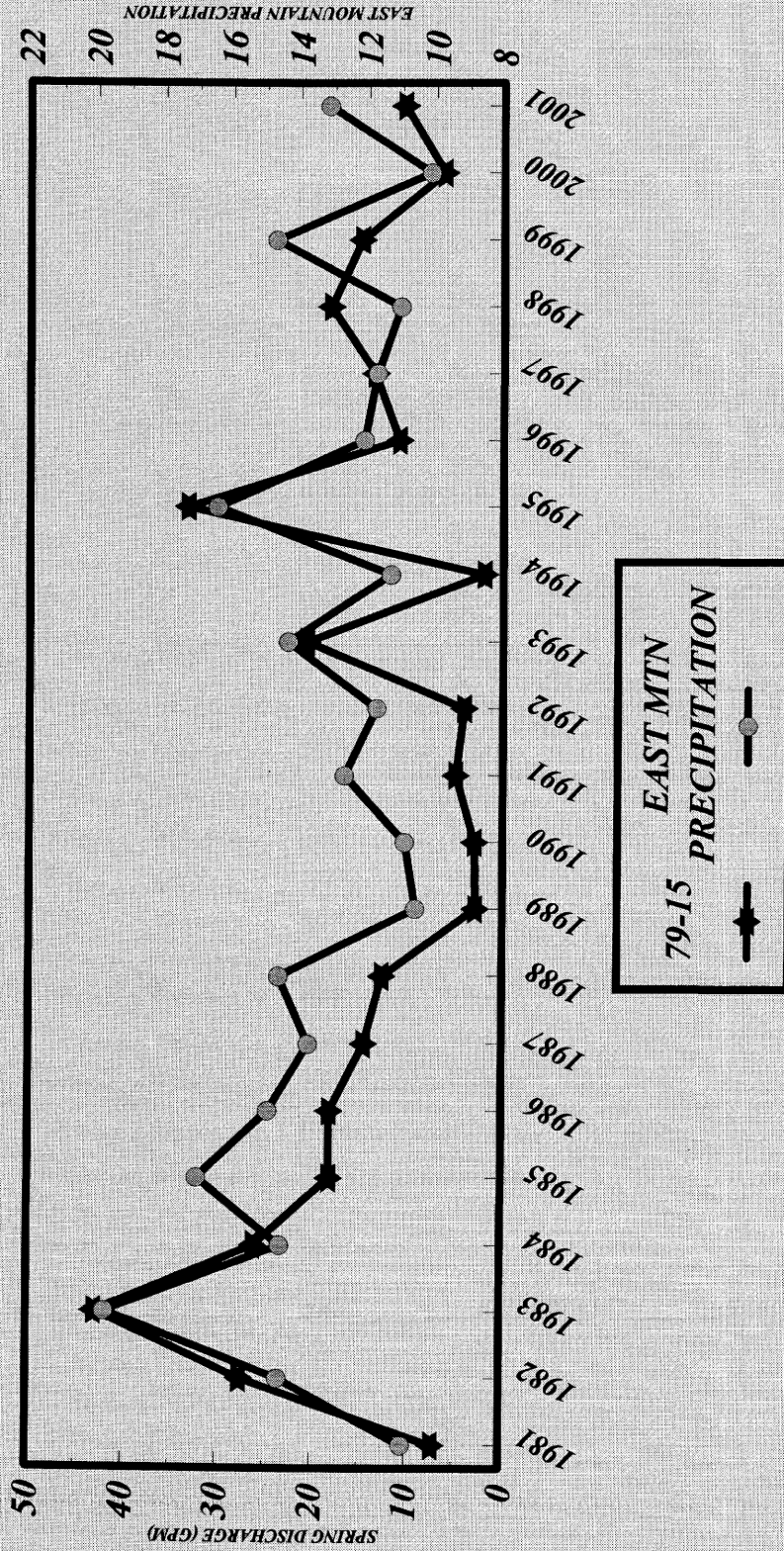


— 79-10

# EAST MOUNTAIN SPRINGS

## Spring: 79-15 vs. Precipitation

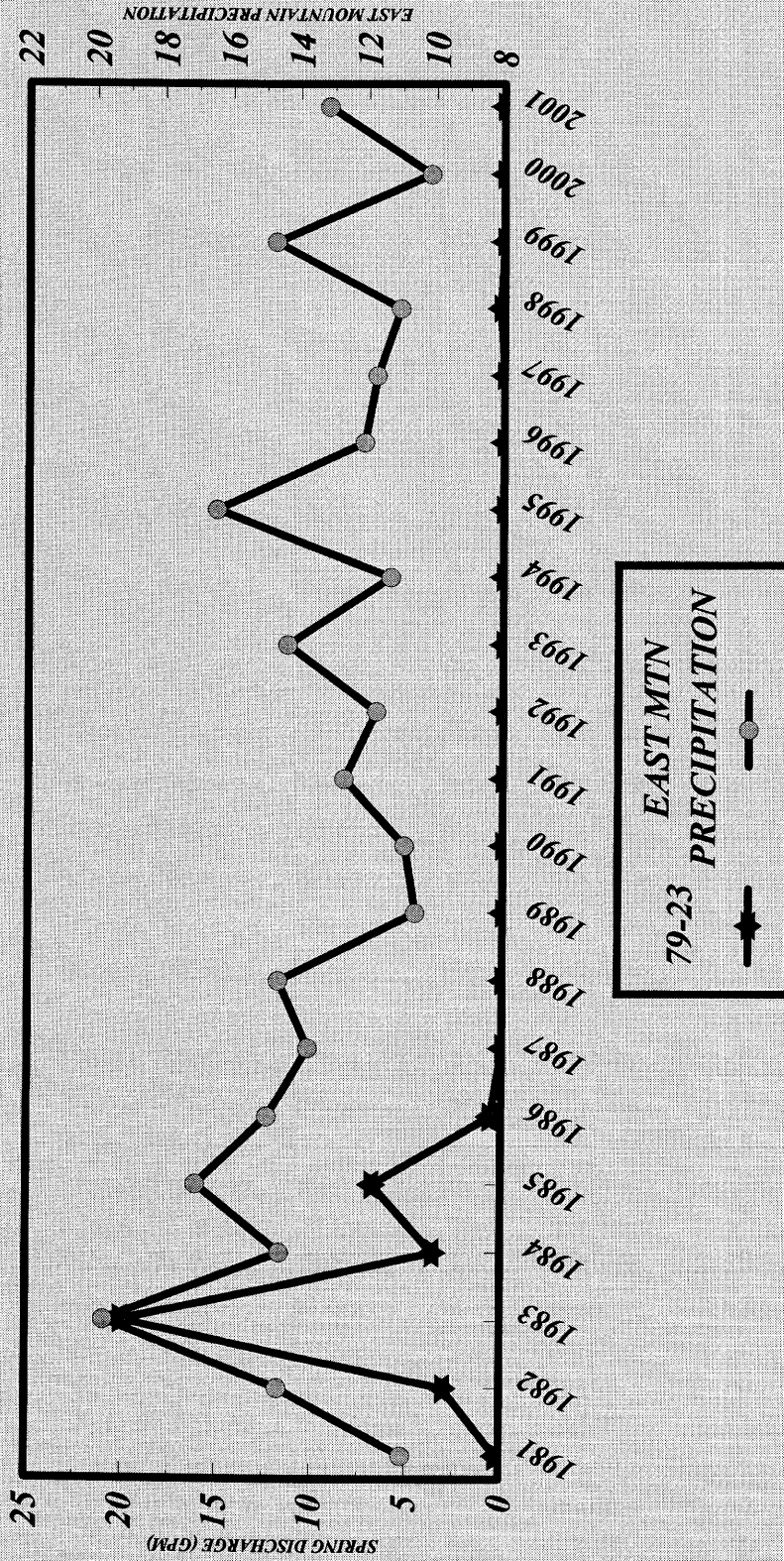
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

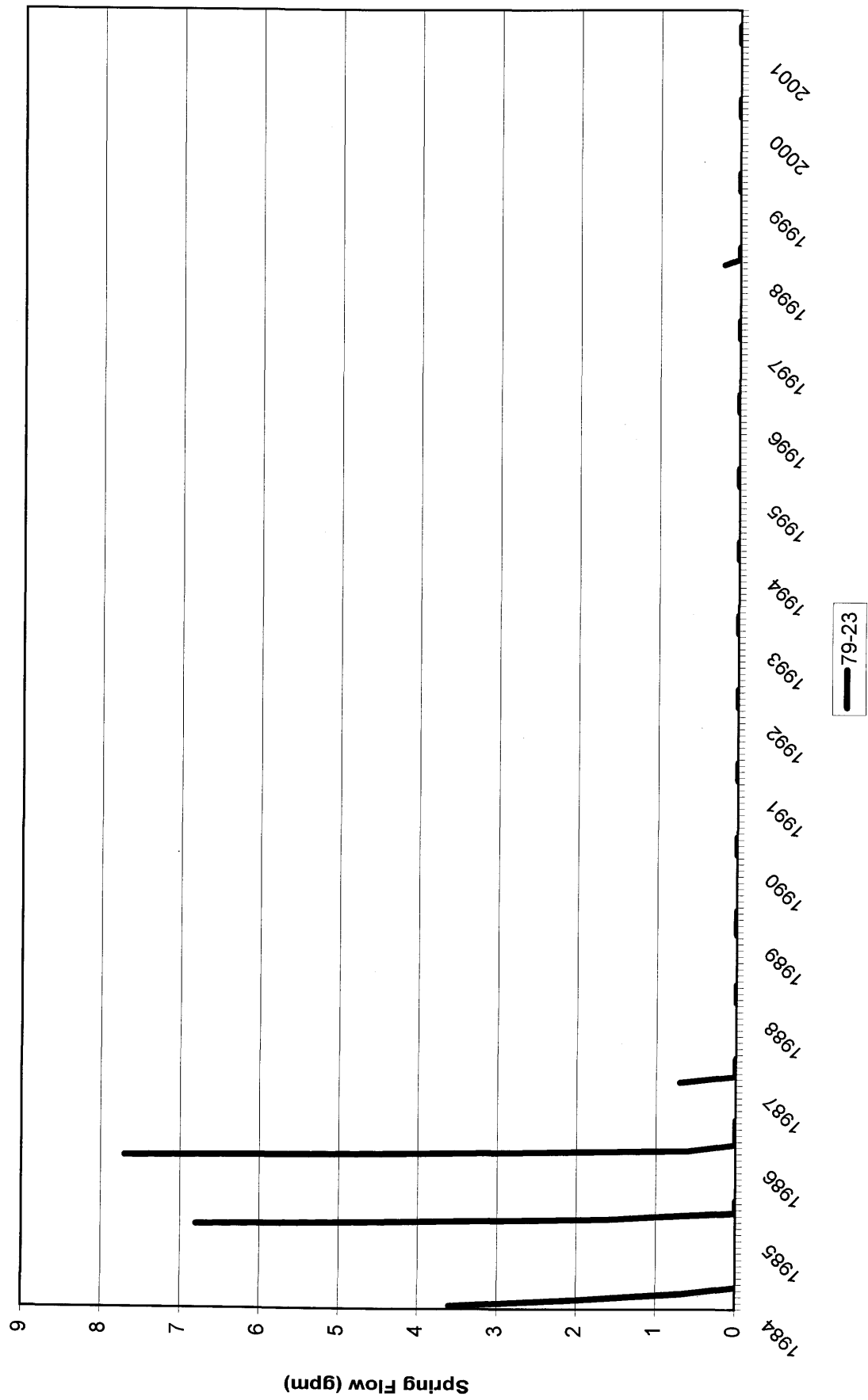
## Spring: 79-23 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



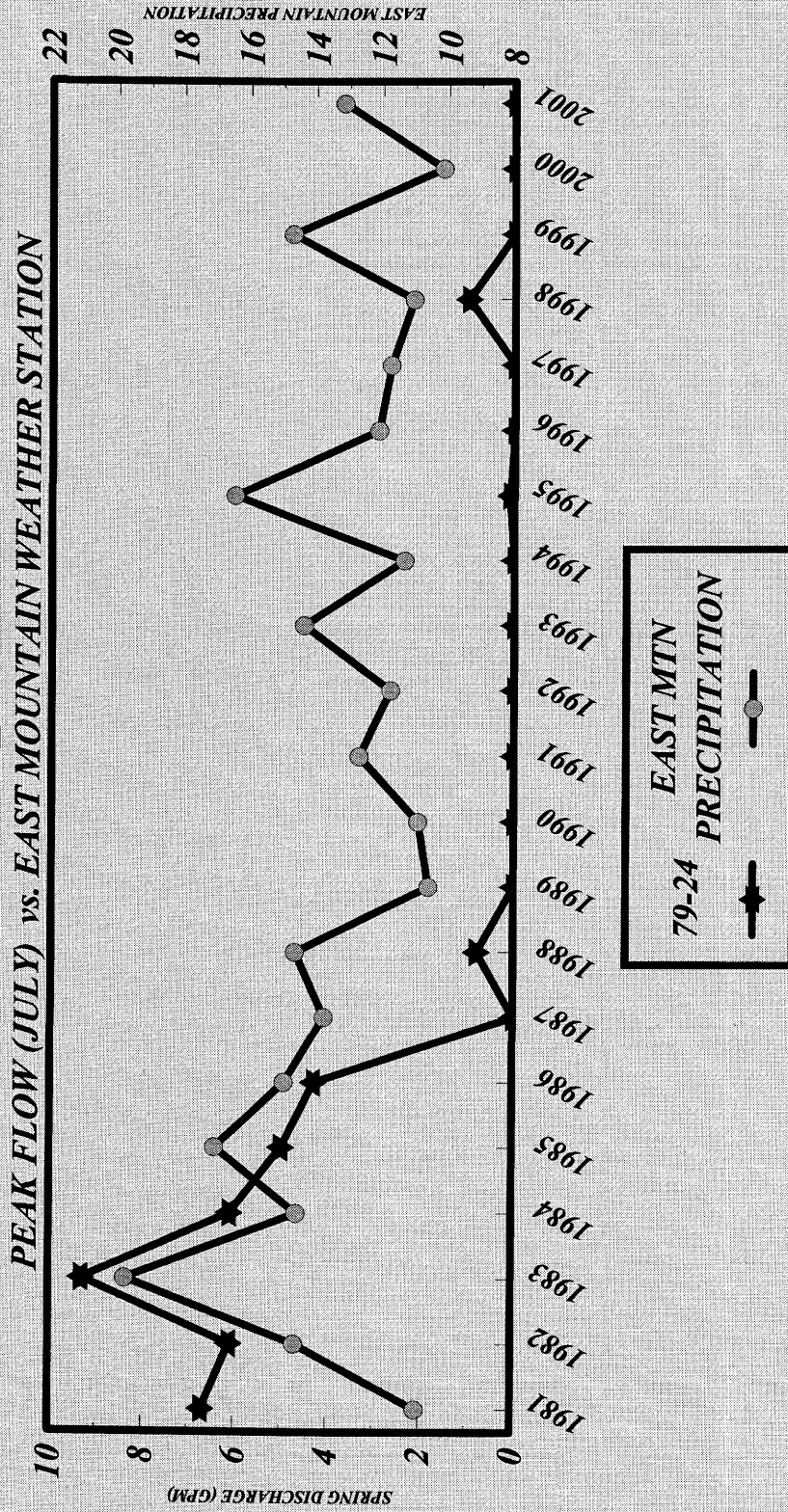


# East Mountain Springs 79-23



# EAST MOUNTAIN SPRINGS

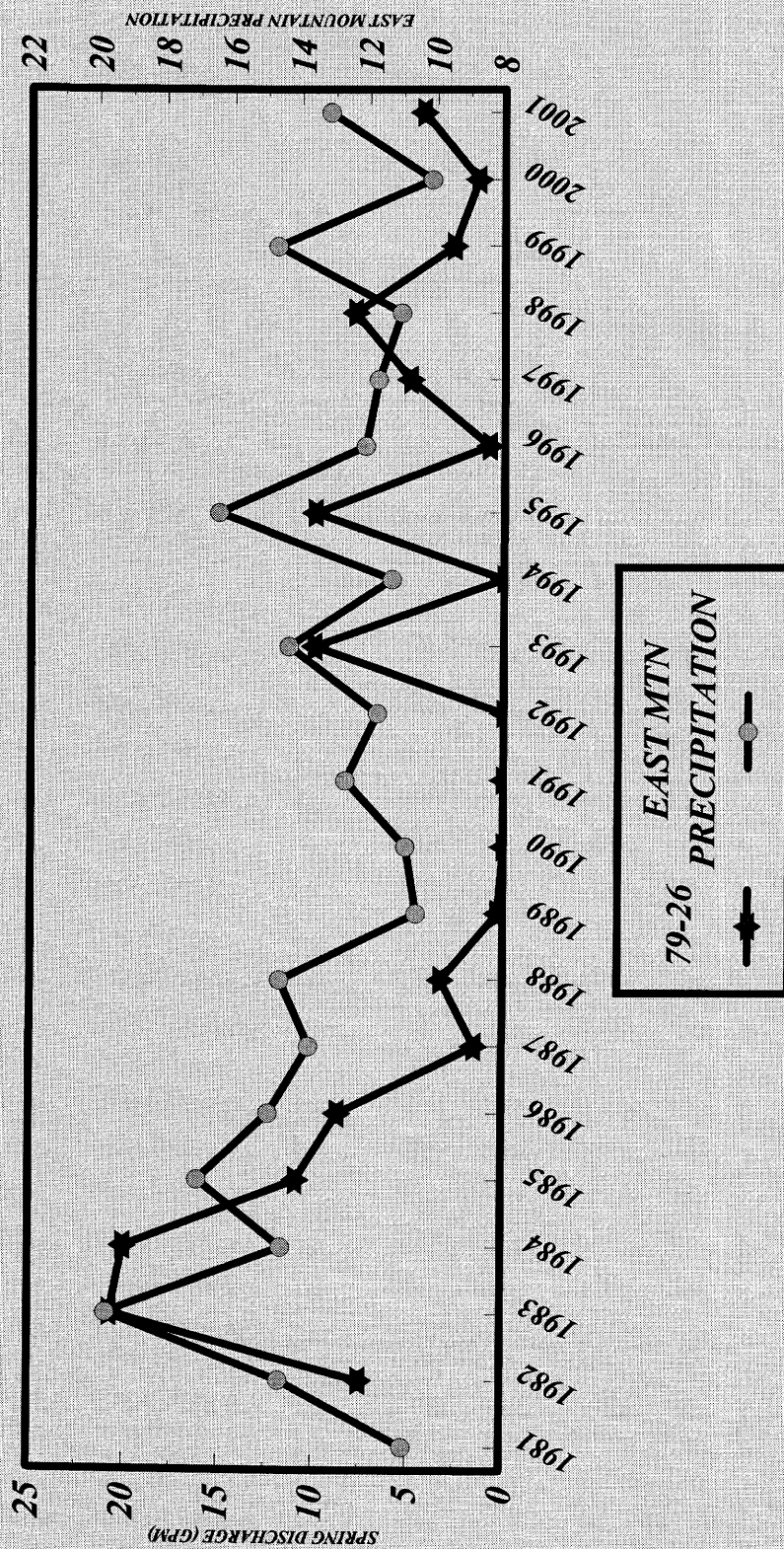
## Spring: 79-24 vs. Precipitation



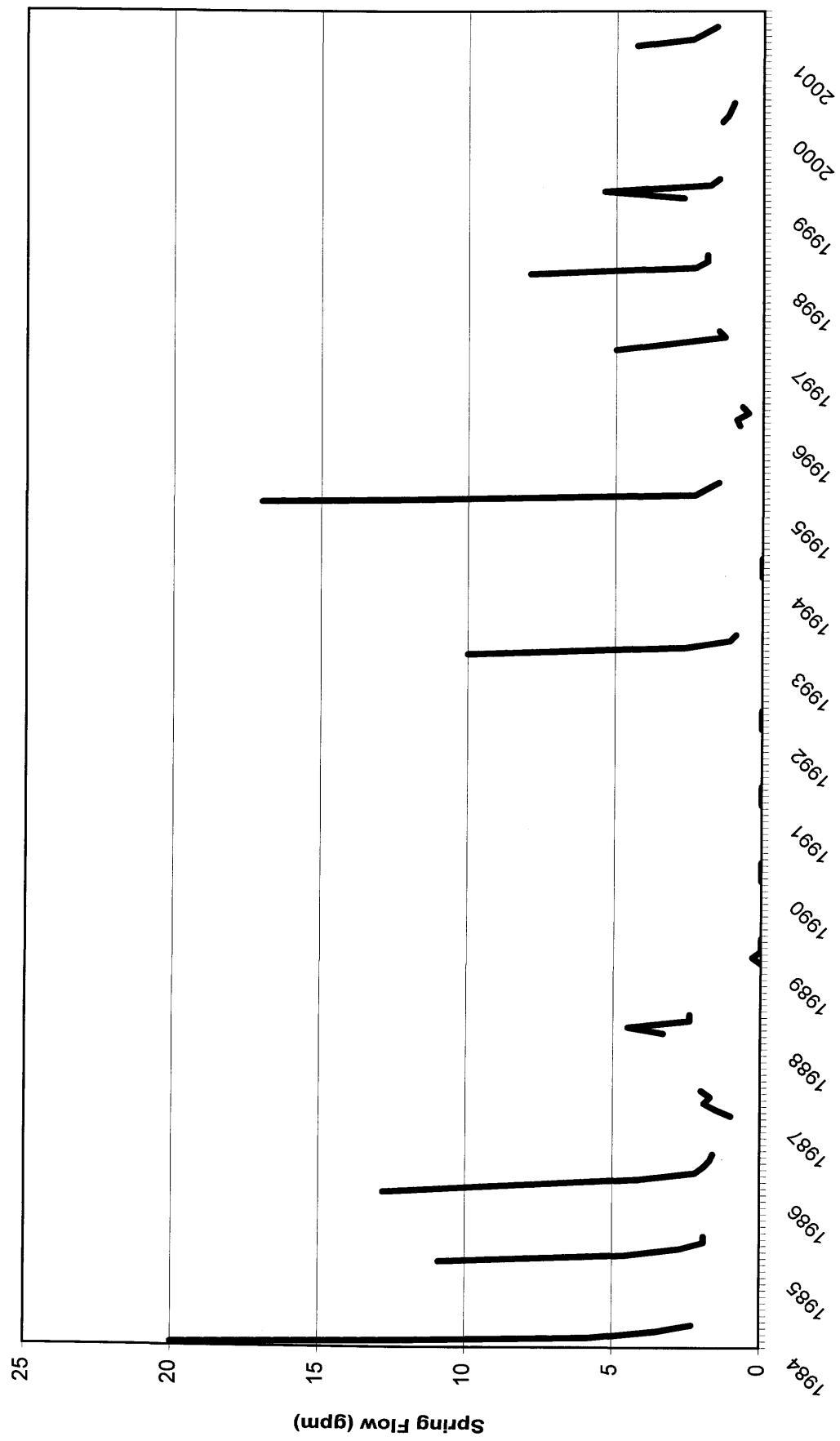
# EAST MOUNTAIN SPRINGS

## Spring: 79-26 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# East Mountain Springs 79-26

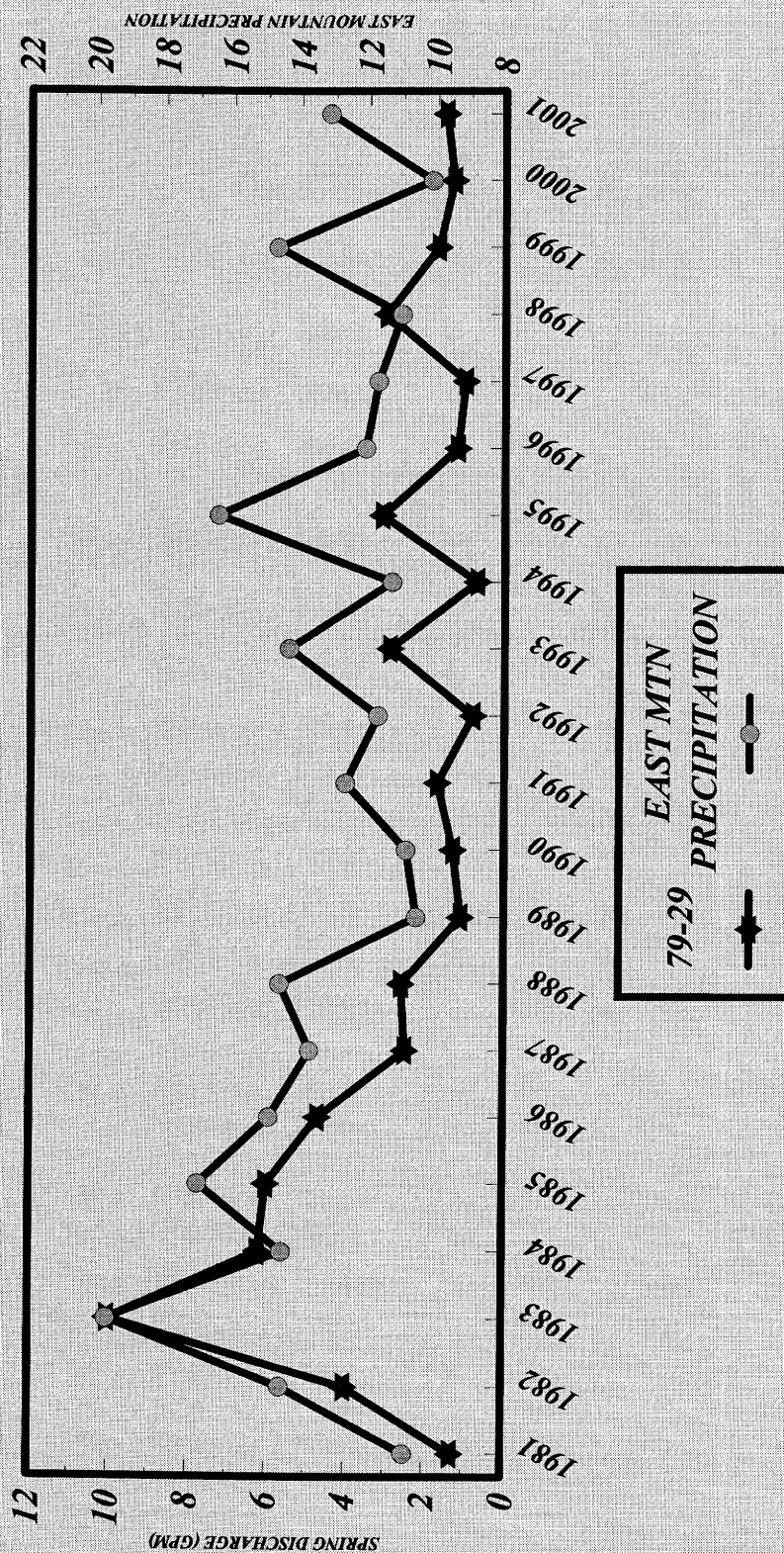




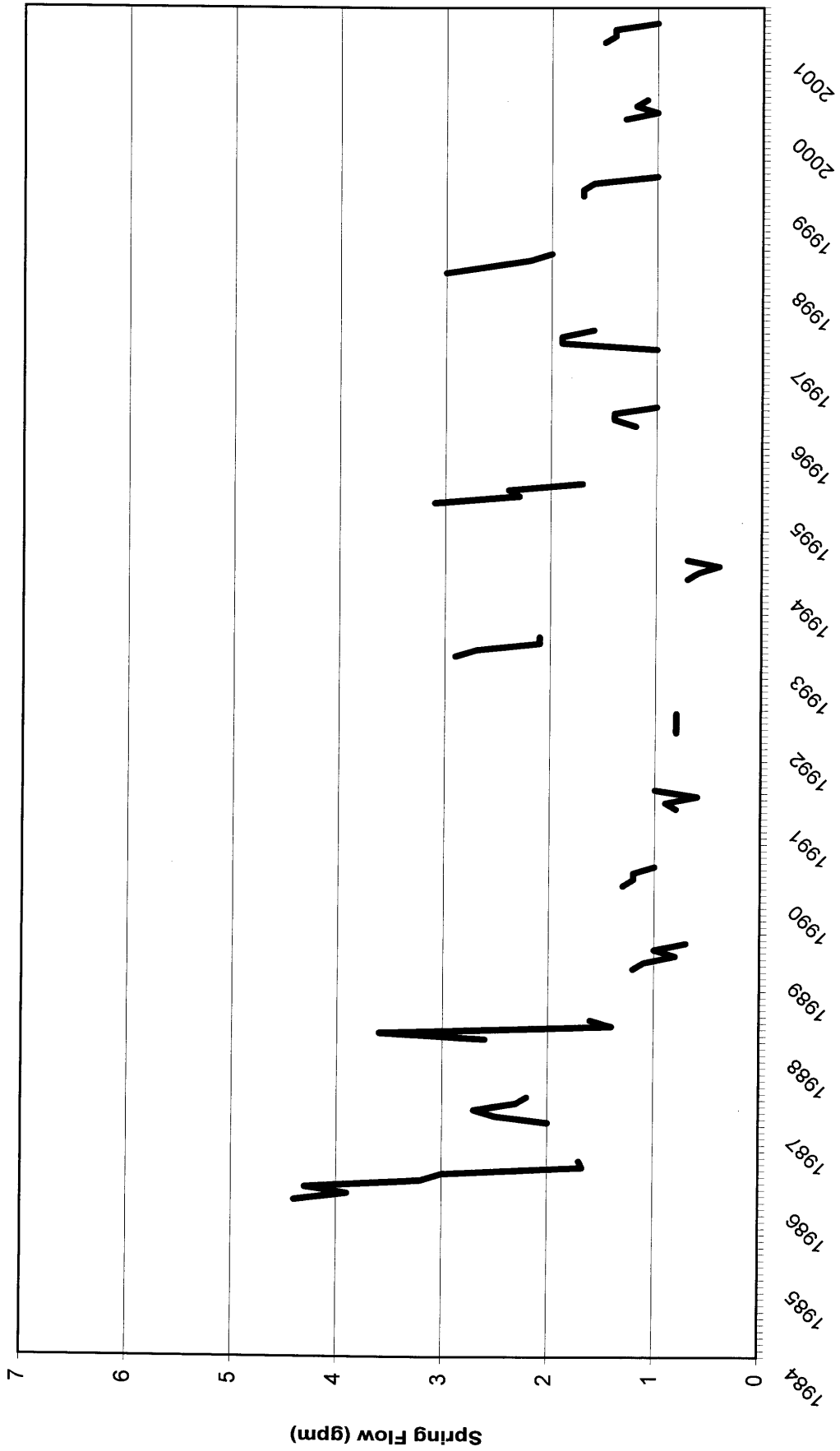
# EAST MOUNTAIN SPRINGS

## Spring: 79-29 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# East Mountain Springs 79-29

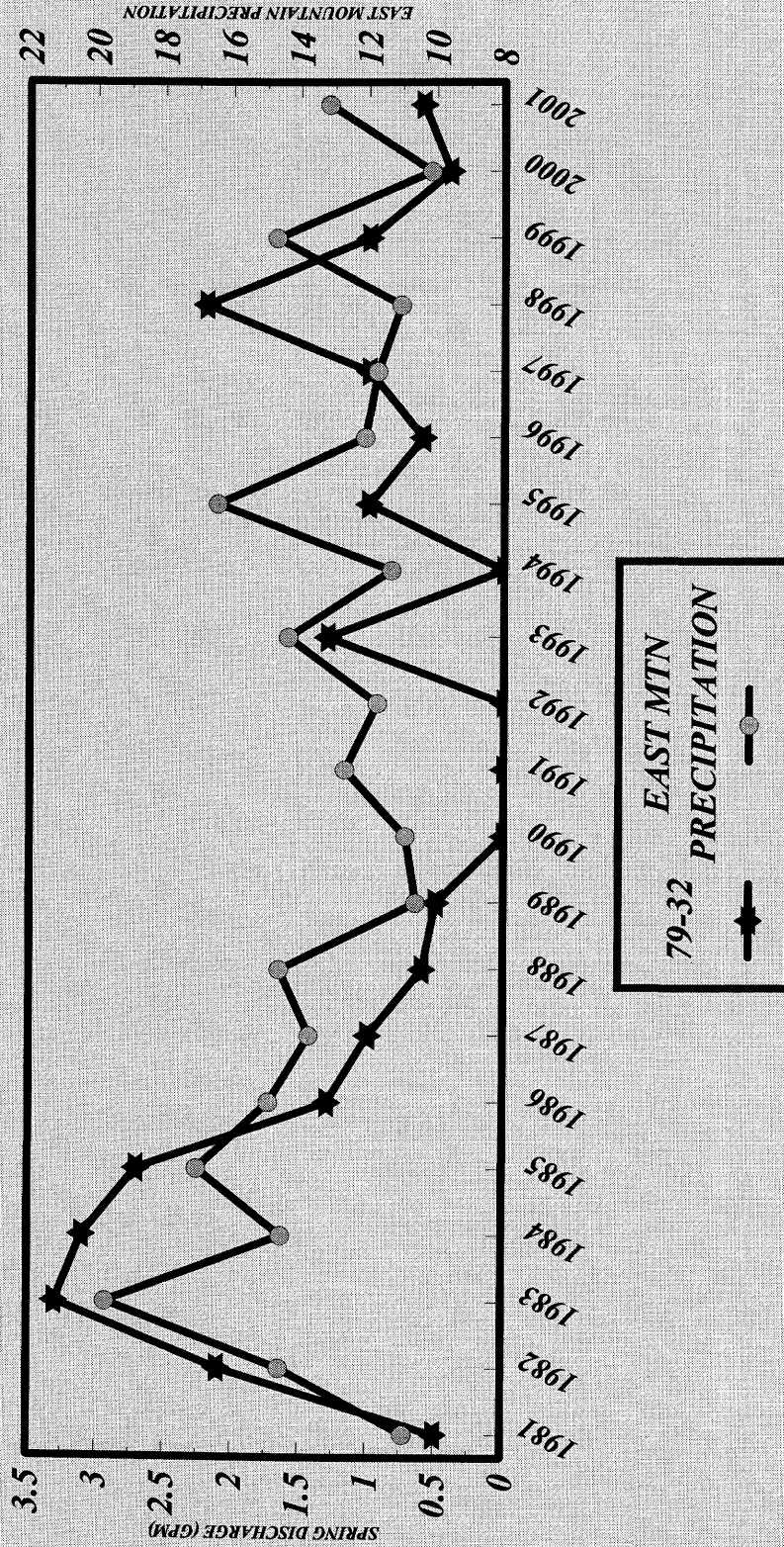


— 79-29

# EAST MOUNTAIN SPRINGS

## Spring: 79-32 vs. Precipitation

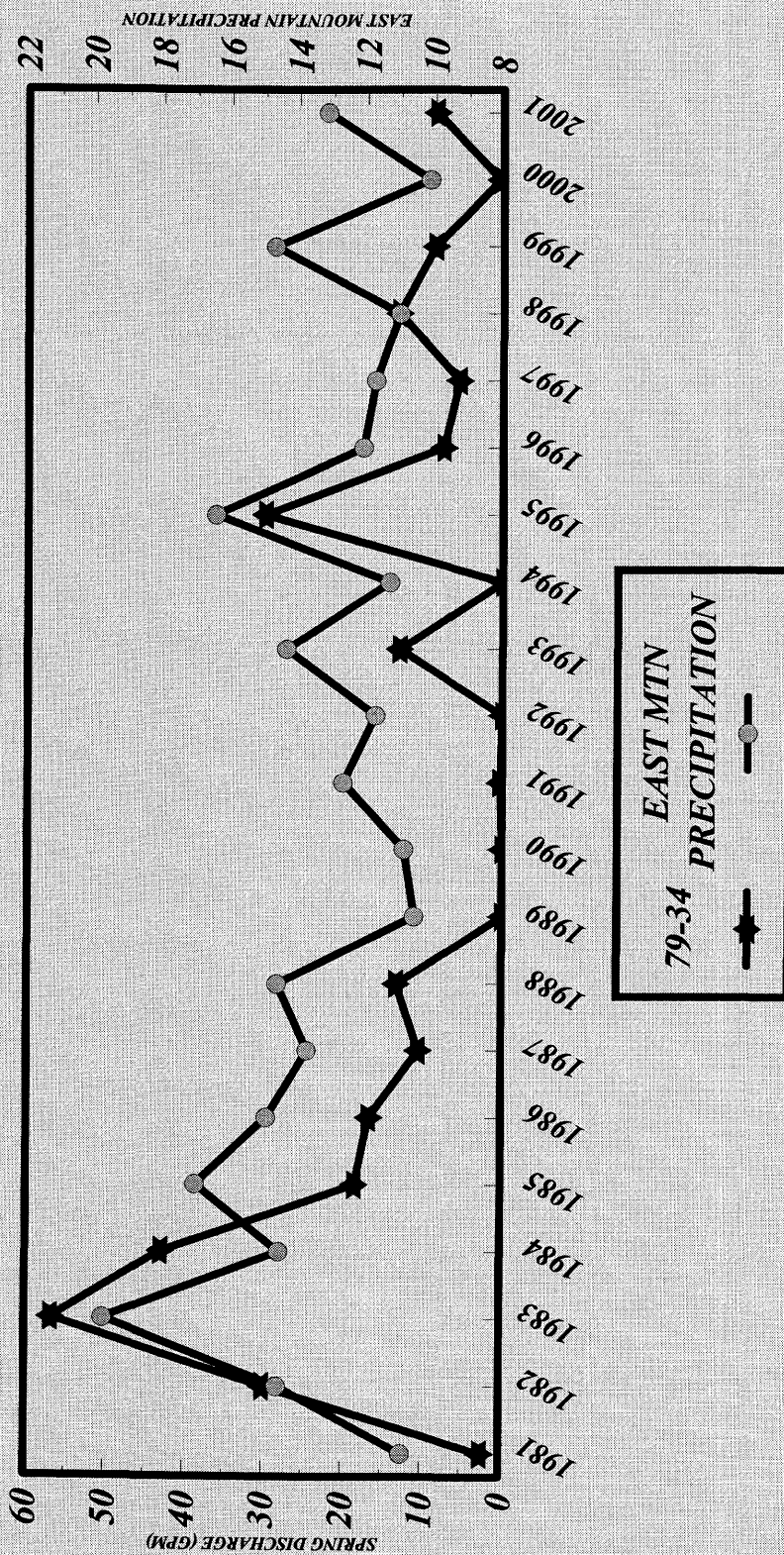
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## Spring: 79-34 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

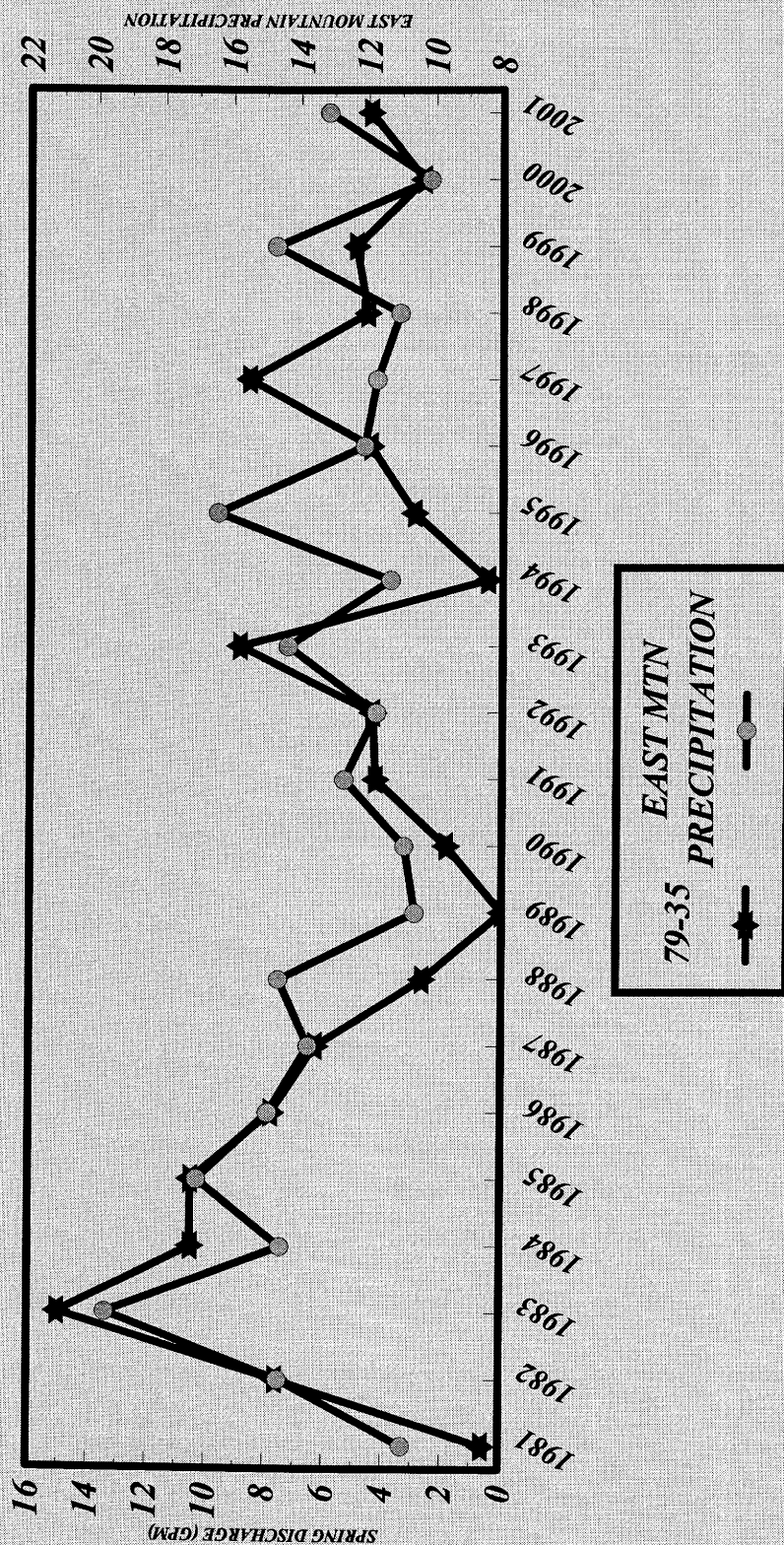




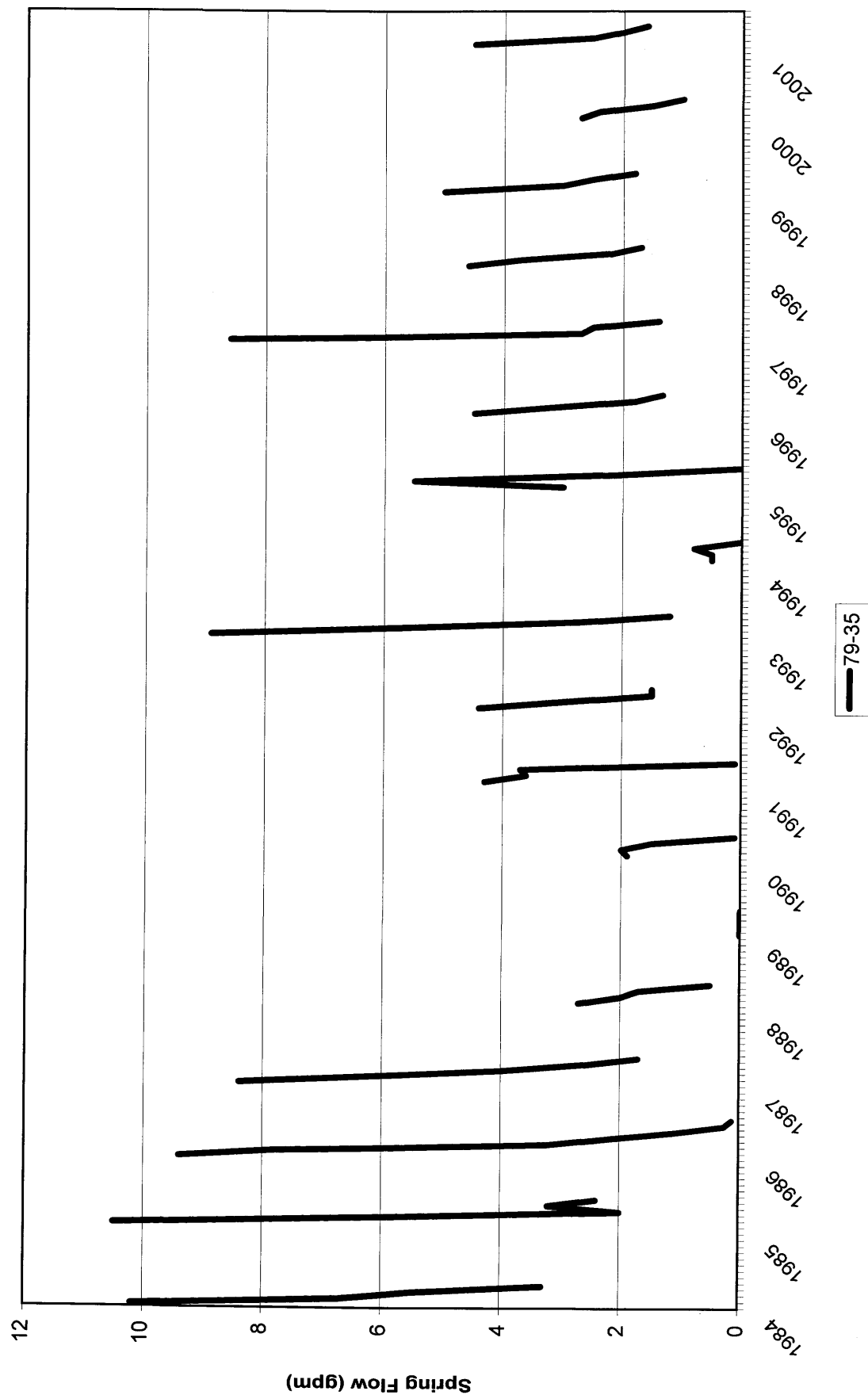
# EAST MOUNTAIN SPRINGS

## Spring: 79-35 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



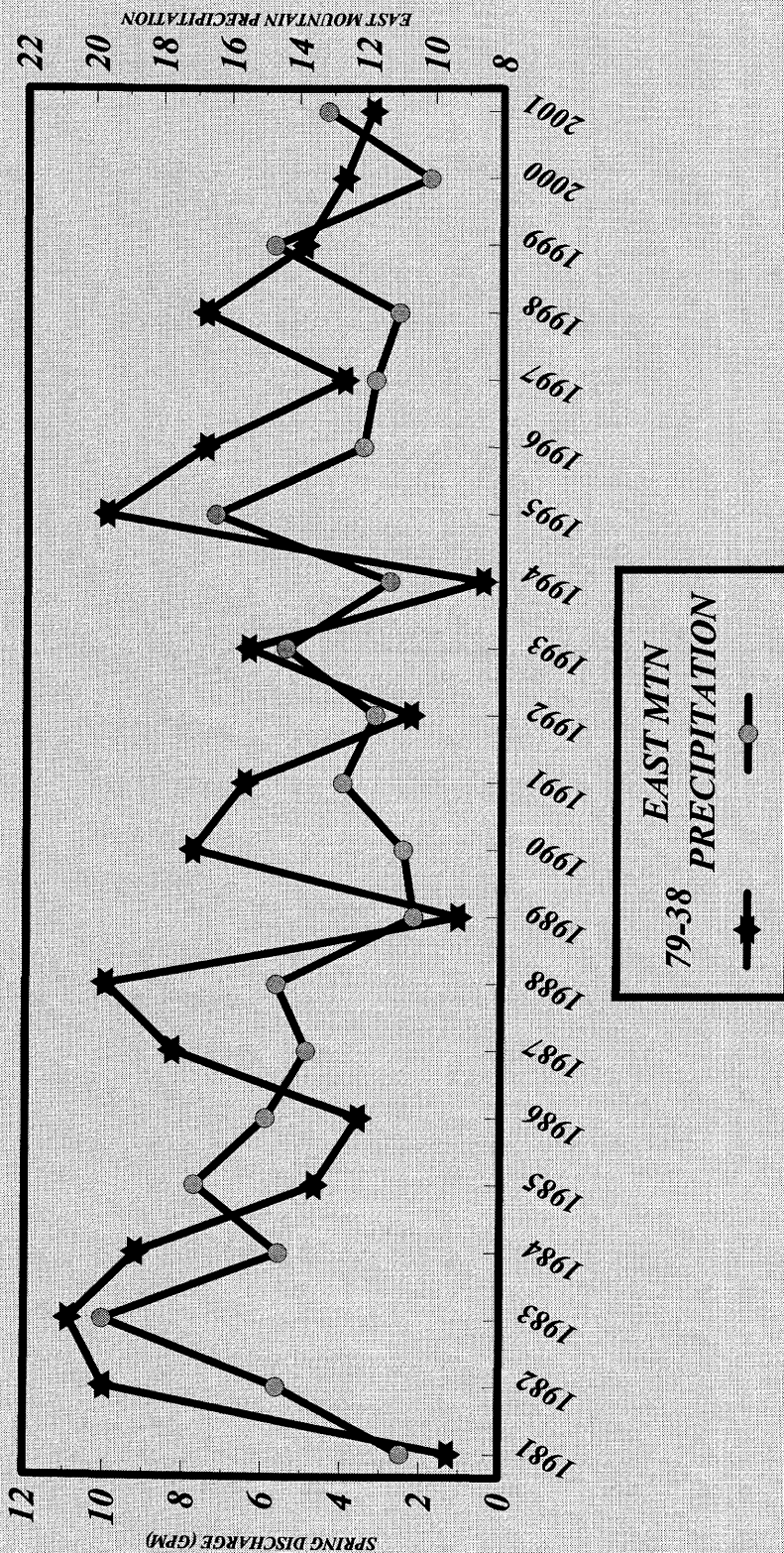
# East Mountain Springs 79-35



# EAST MOUNTAIN SPRINGS

## Spring: 79-38 vs. Precipitation

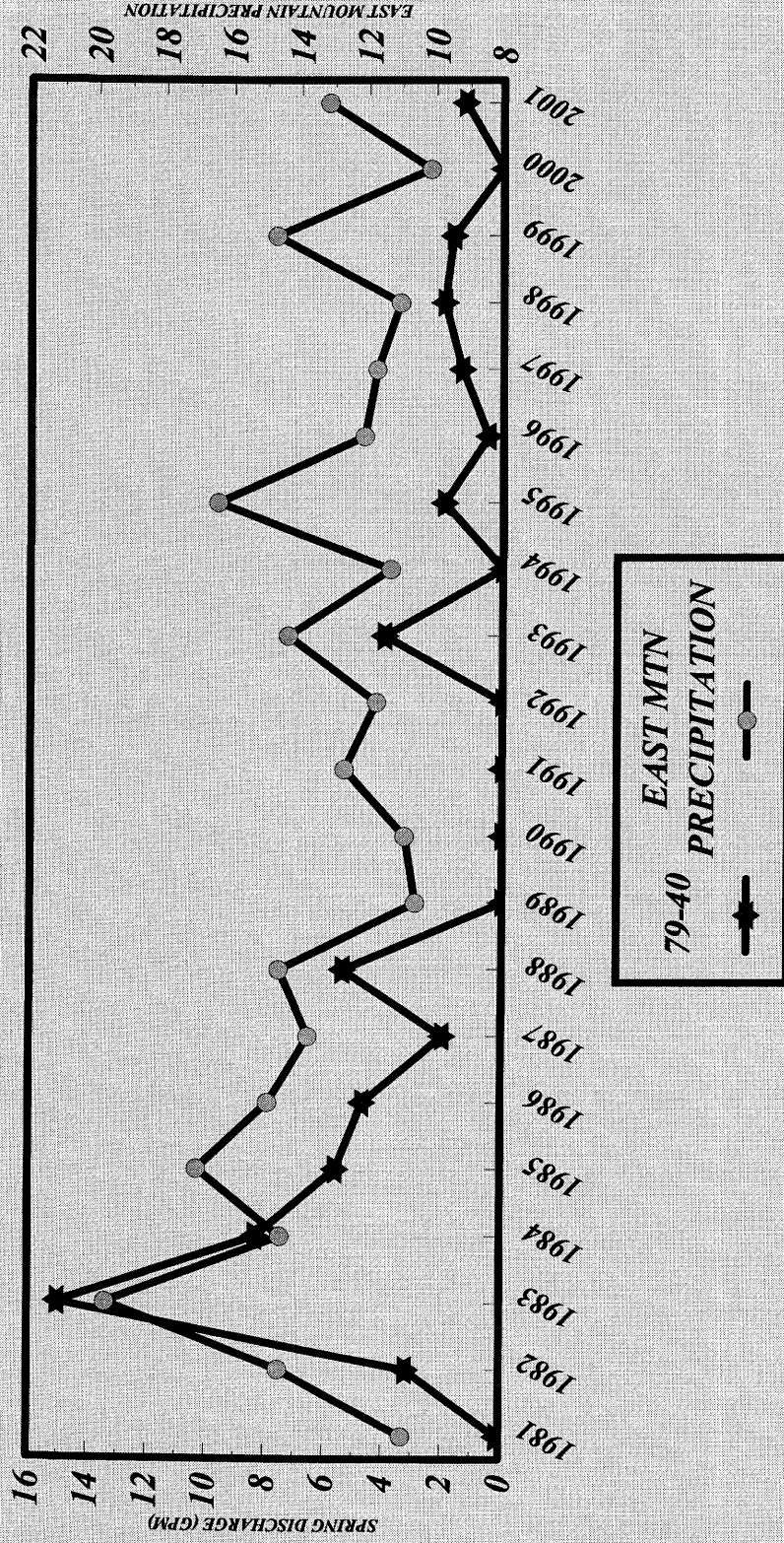
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## Spring: 79-40 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

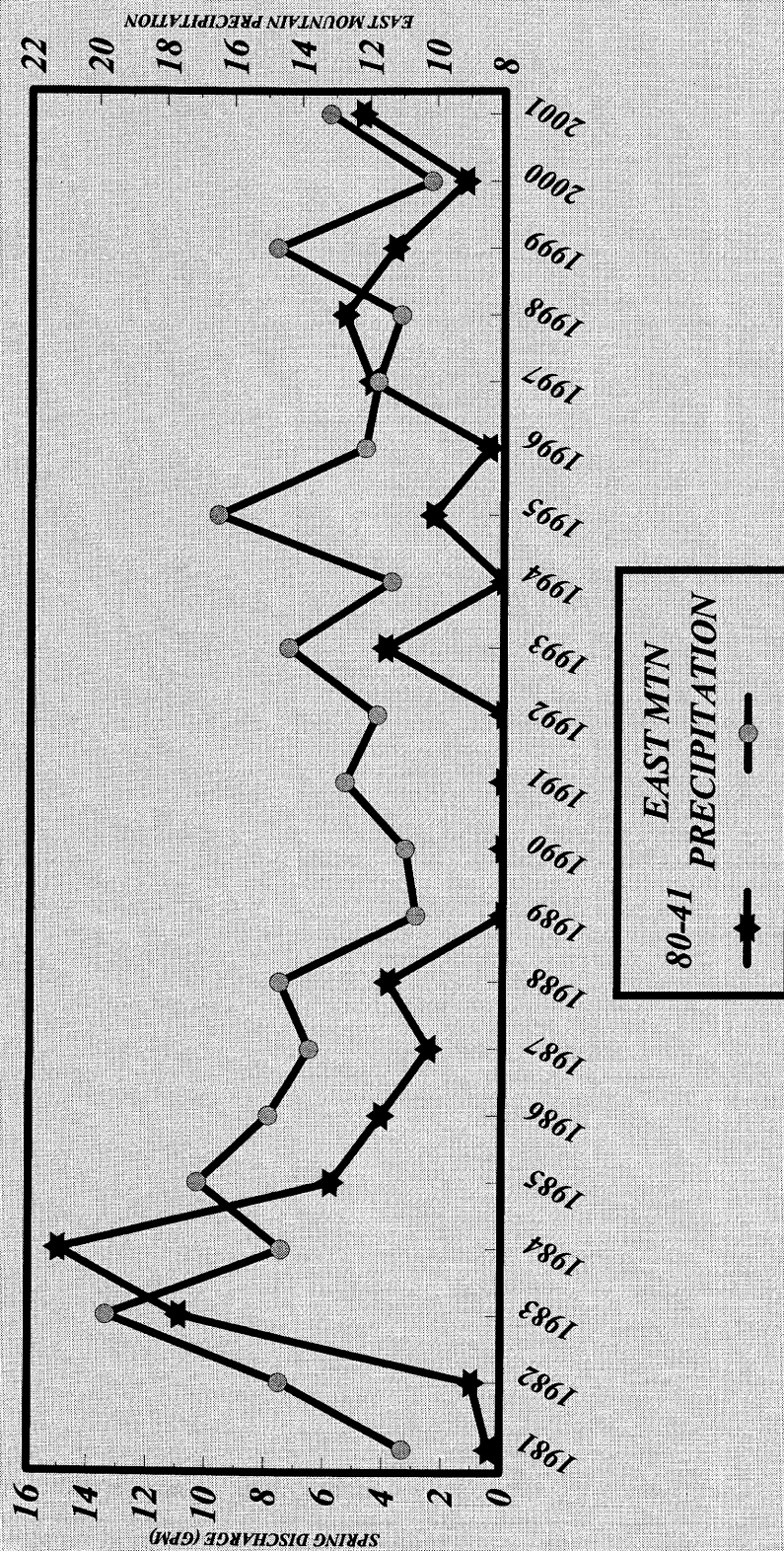




# EAST MOUNTAIN SPRINGS

## Spring: 80-41 vs. Precipitation

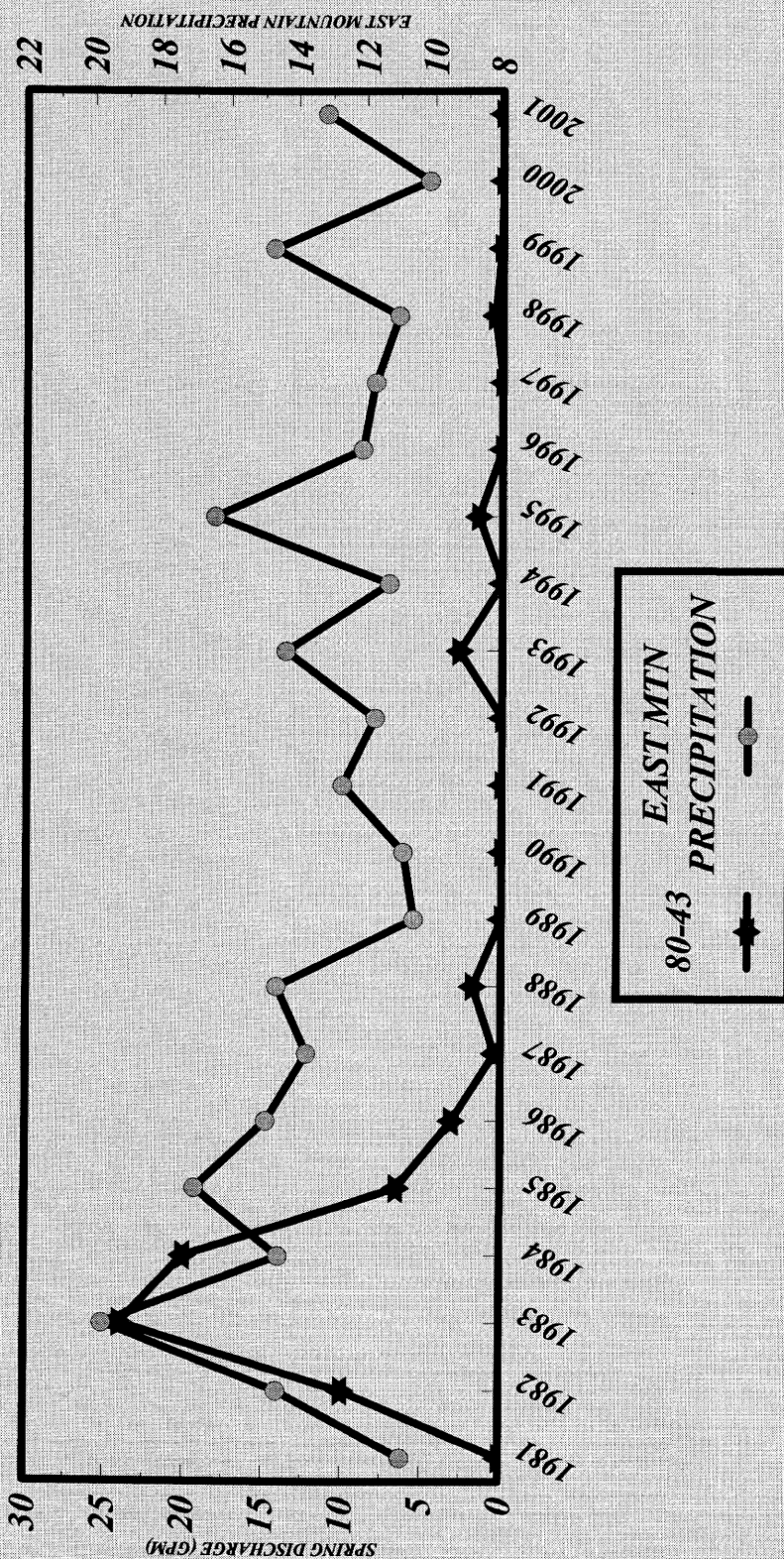
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## Spring: 80-43 vs. Precipitation

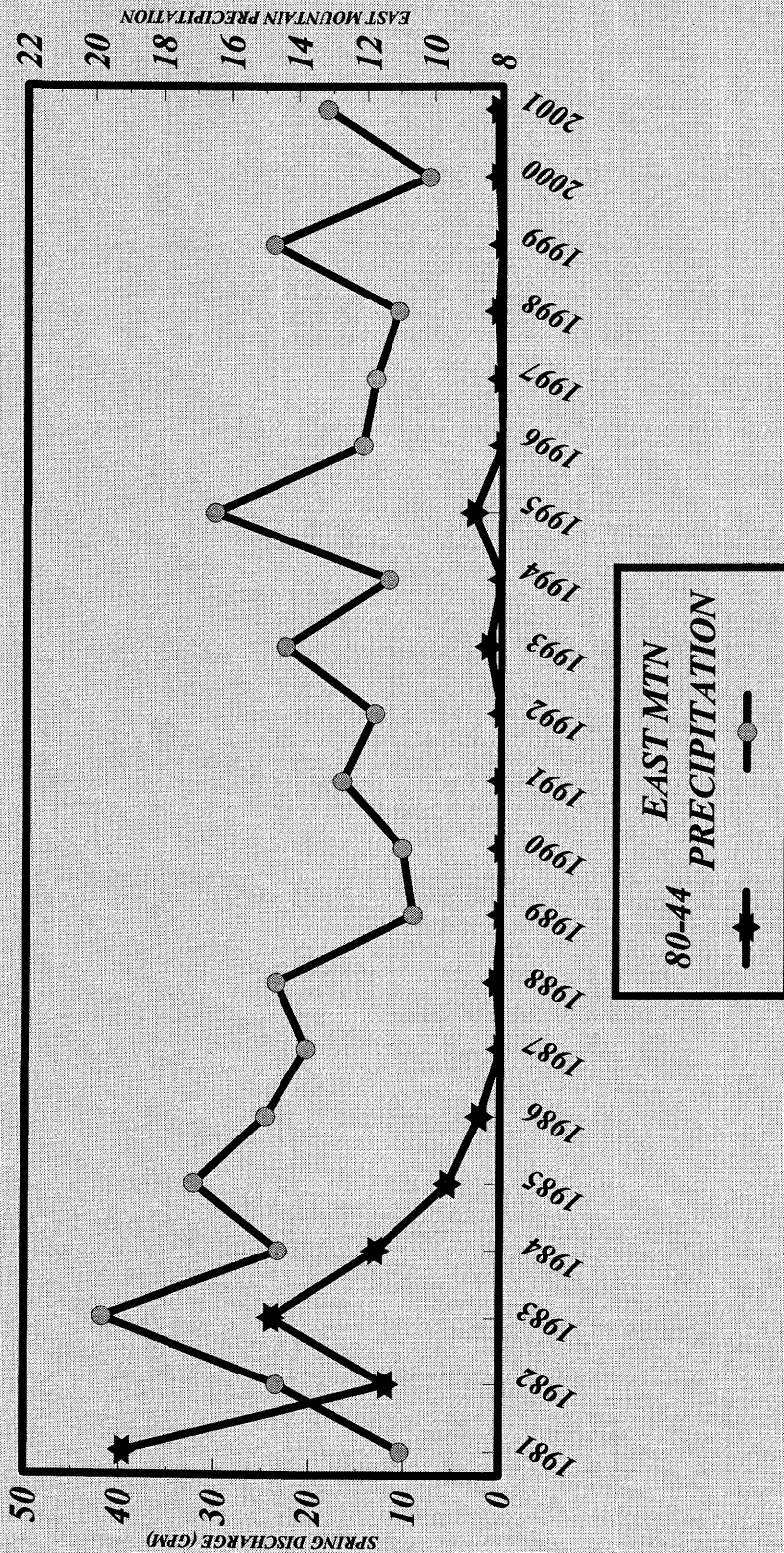
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



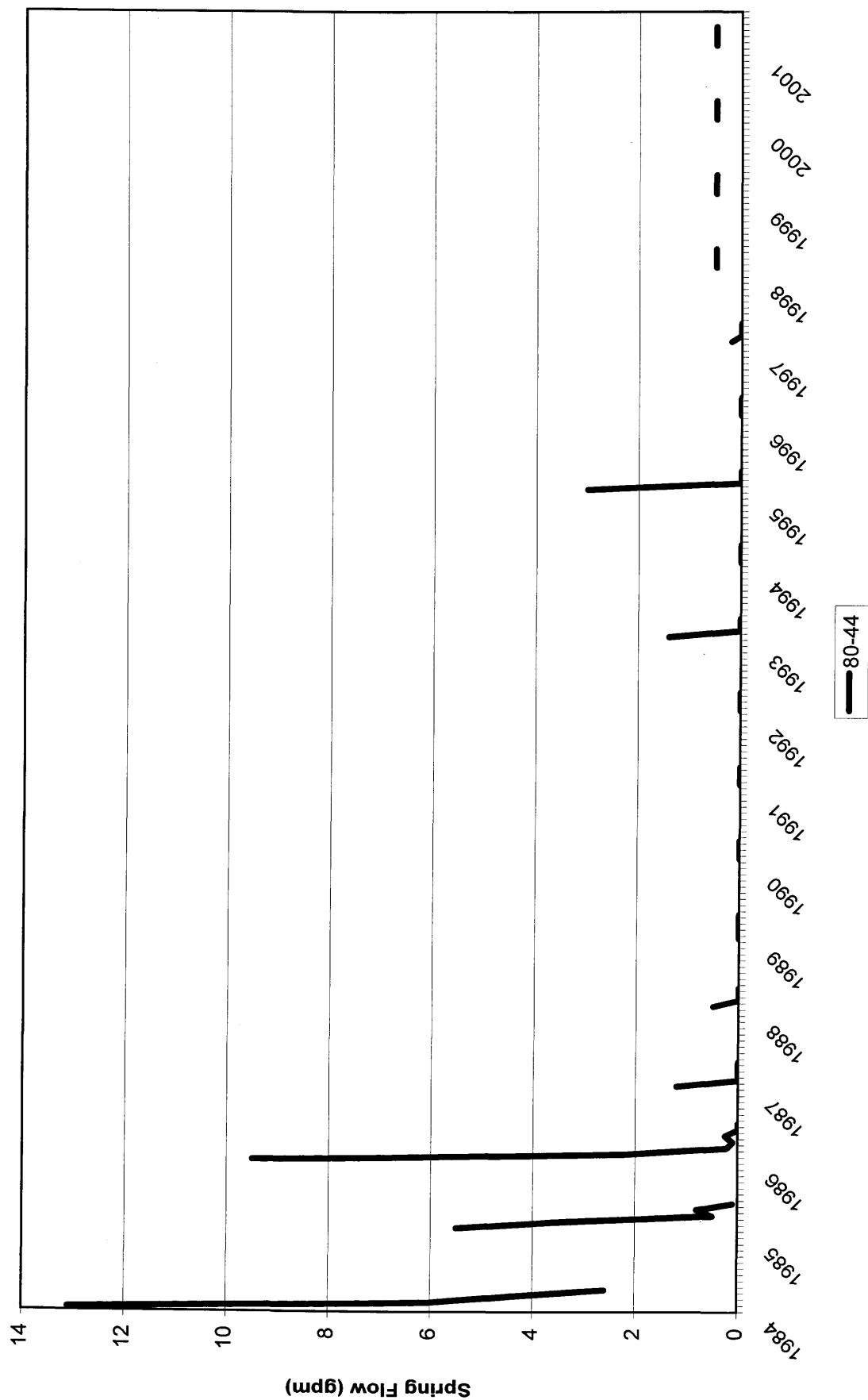
# EAST MOUNTAIN SPRINGS

## Spring: 80-44 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# East Mountain Springs 80-44

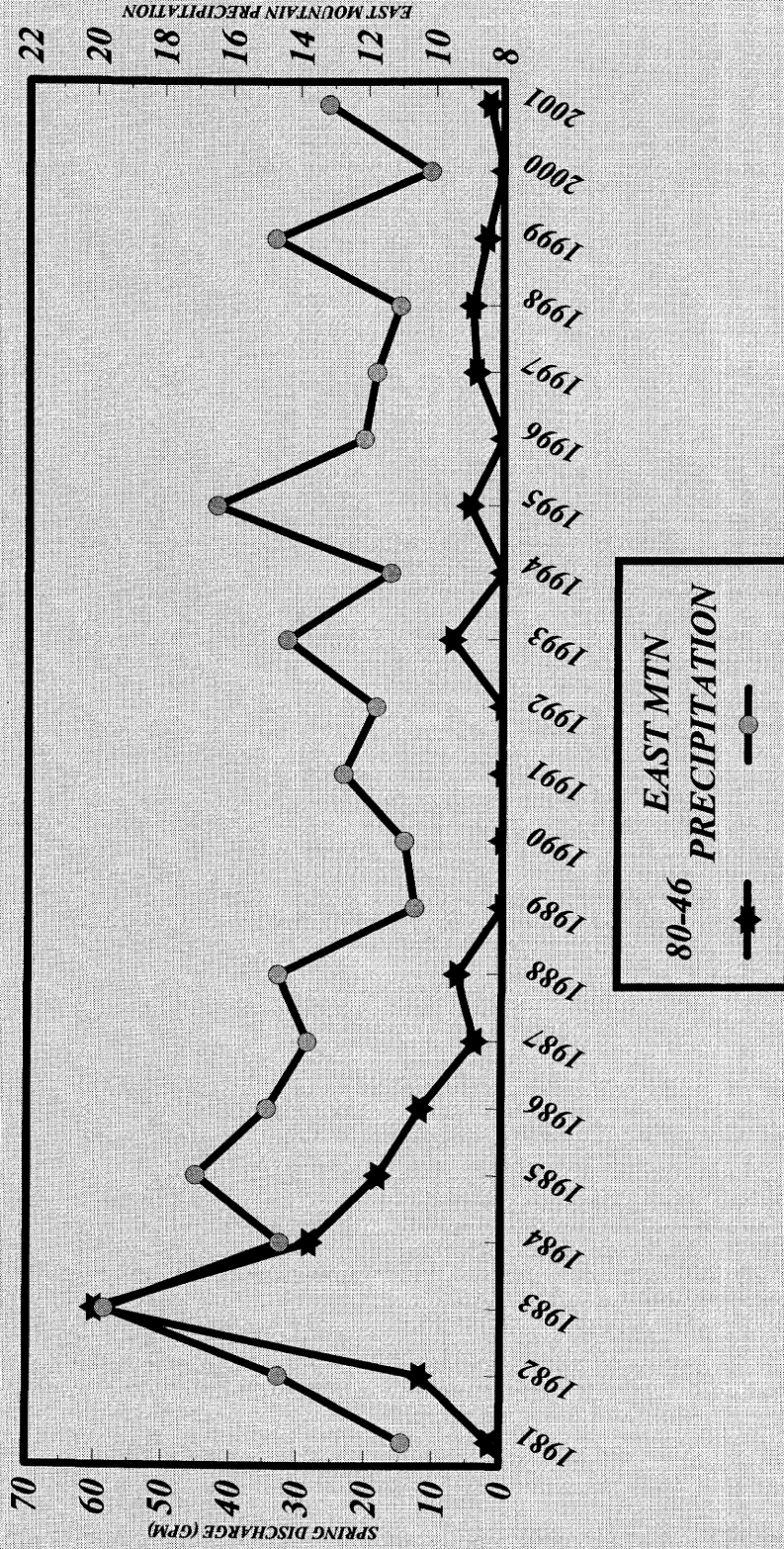




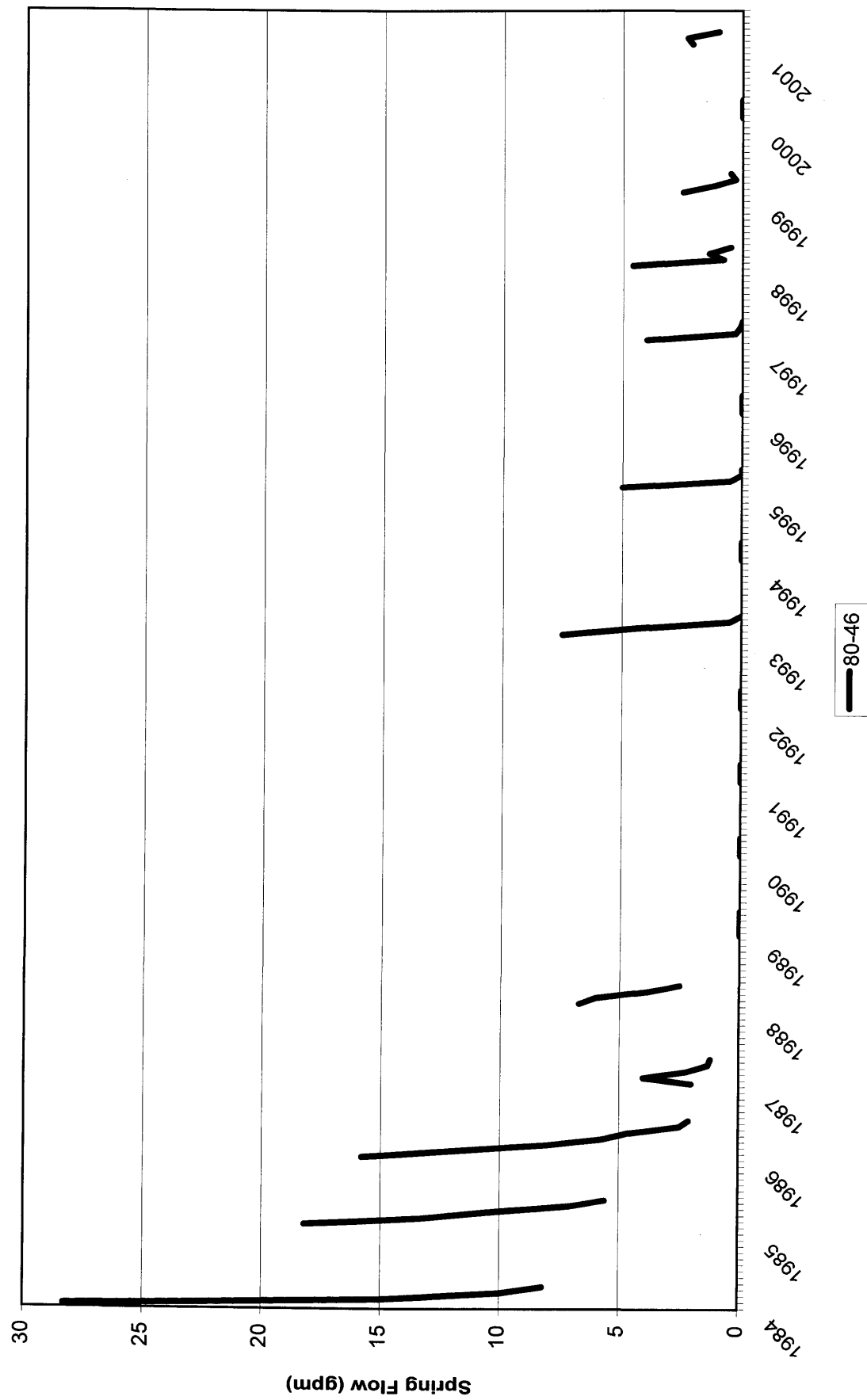
# EAST MOUNTAIN SPRINGS

## Spring: 80-46 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



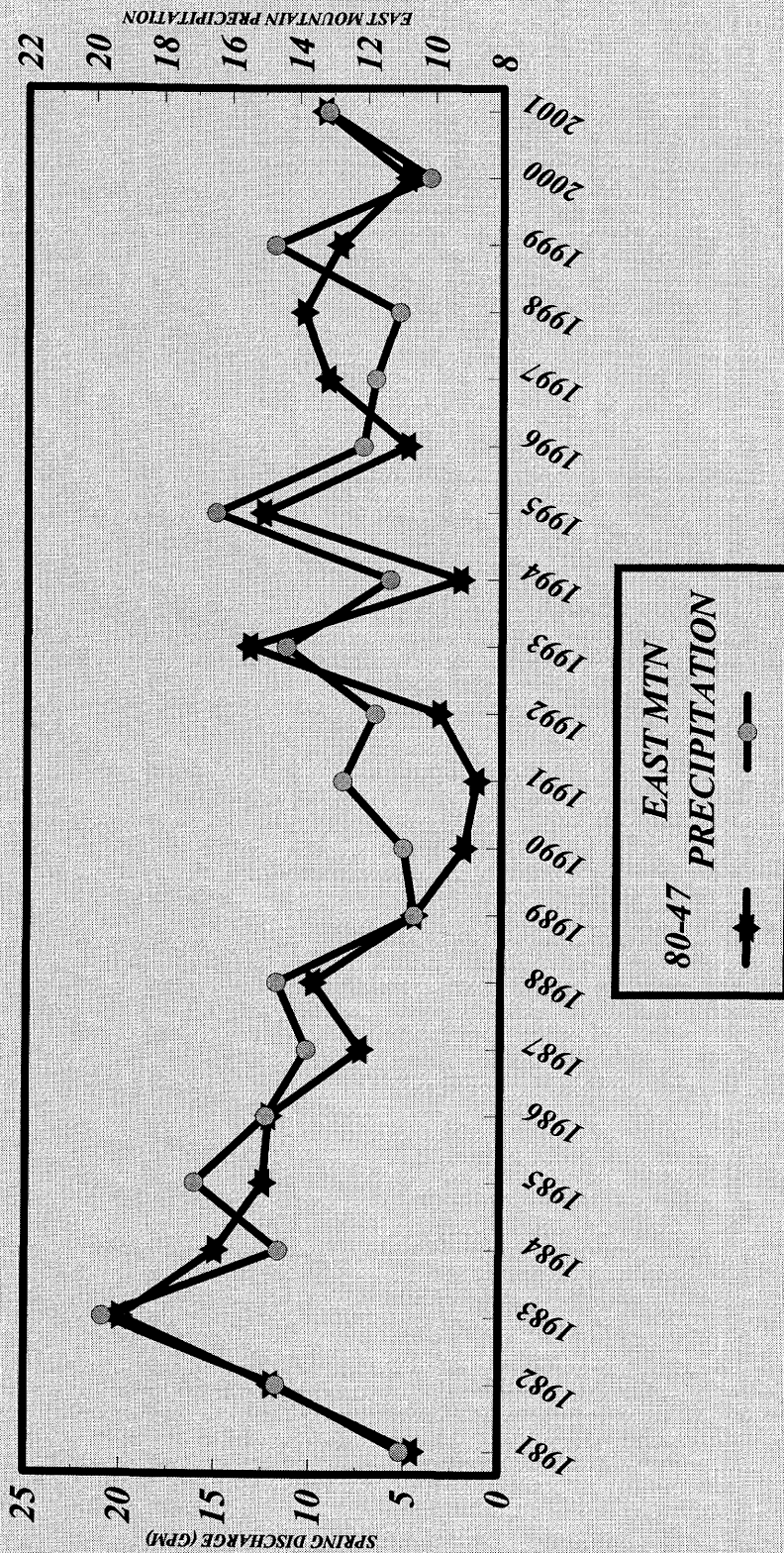
# East Mountain Springs 80-46



# EAST MOUNTAIN SPRINGS

## Spring: 80-47 vs. Precipitation

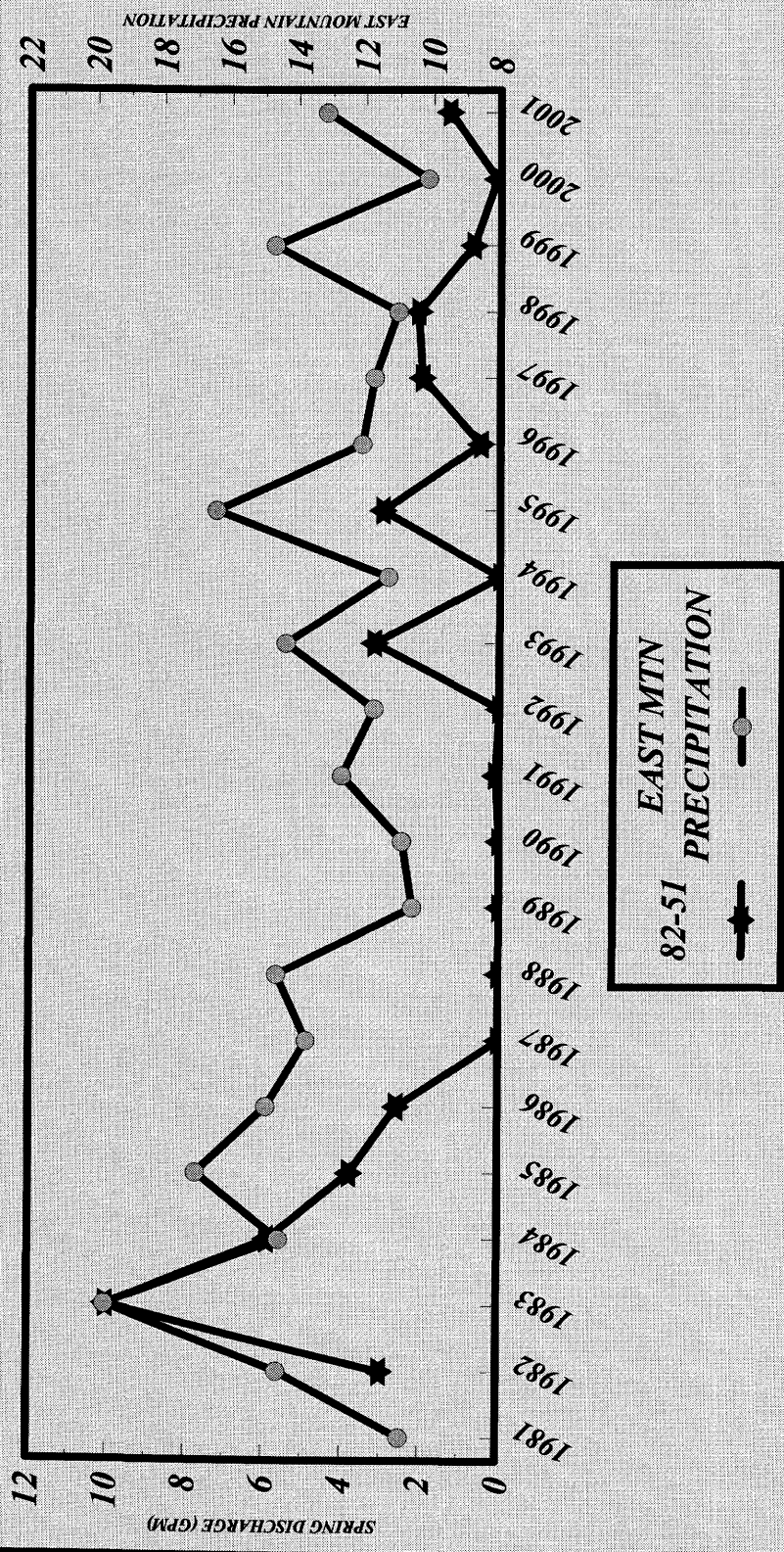
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## Spring: 82-51 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

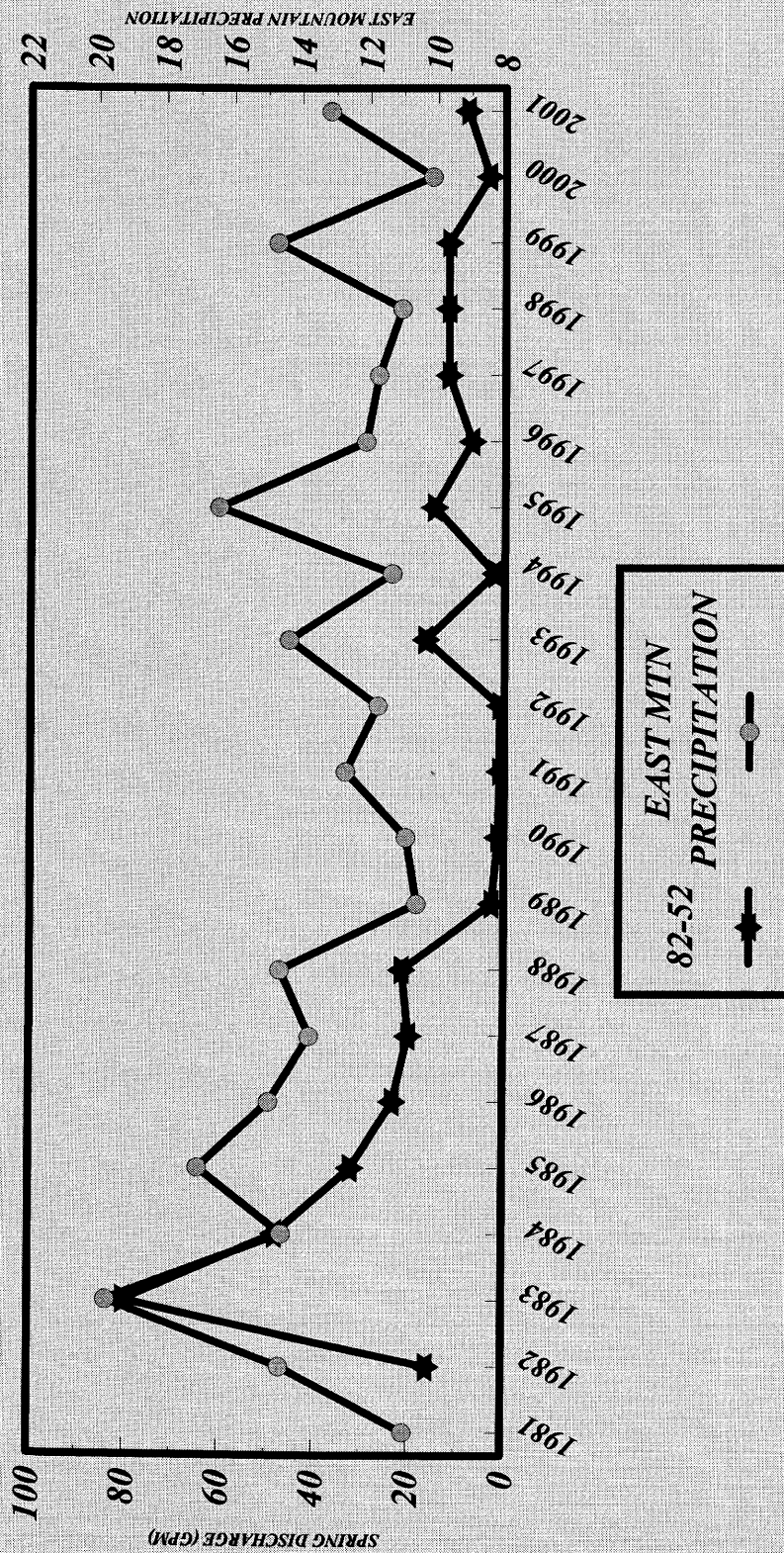




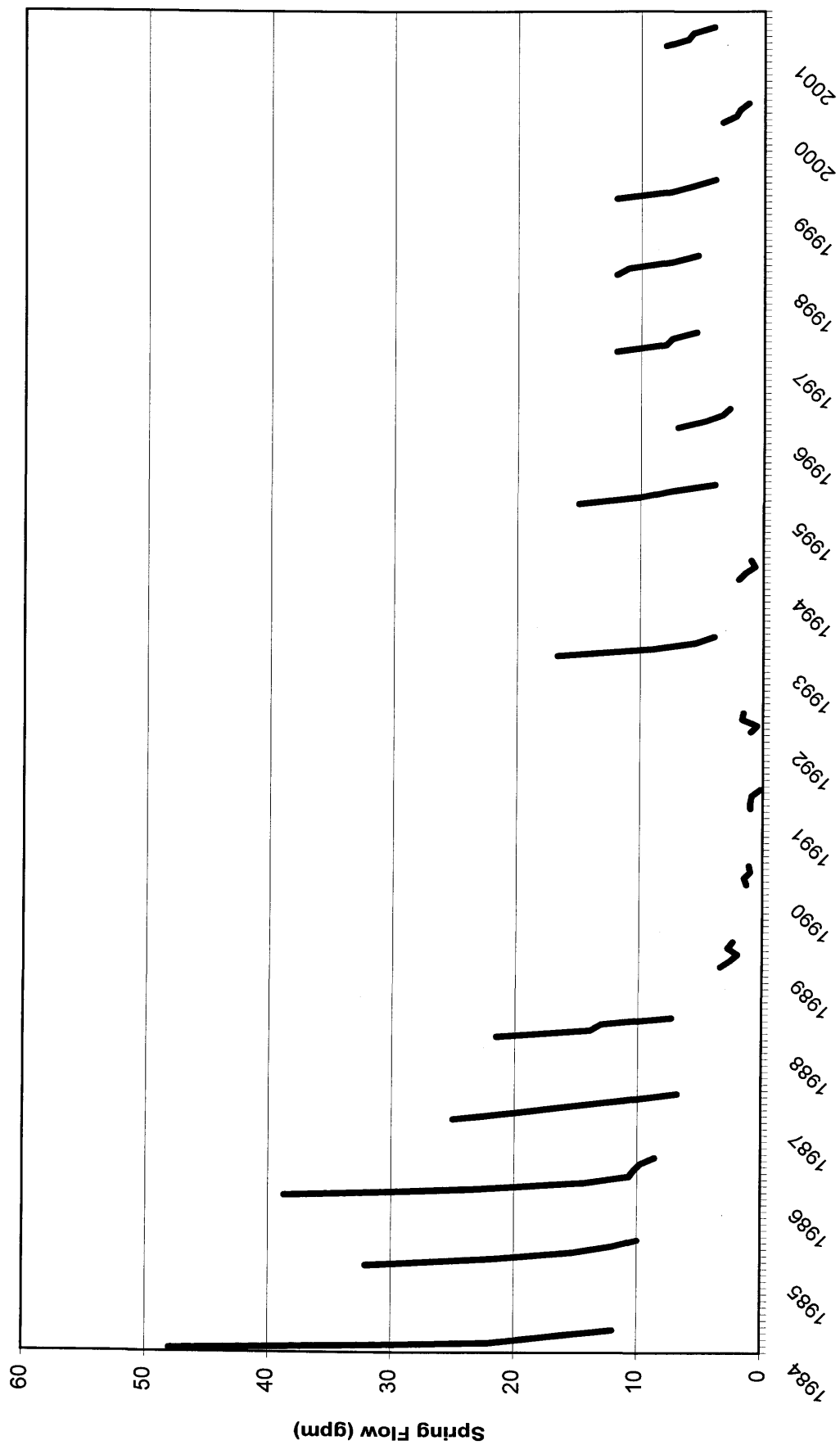
# EAST MOUNTAIN SPRINGS

## Spring: 82-52 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



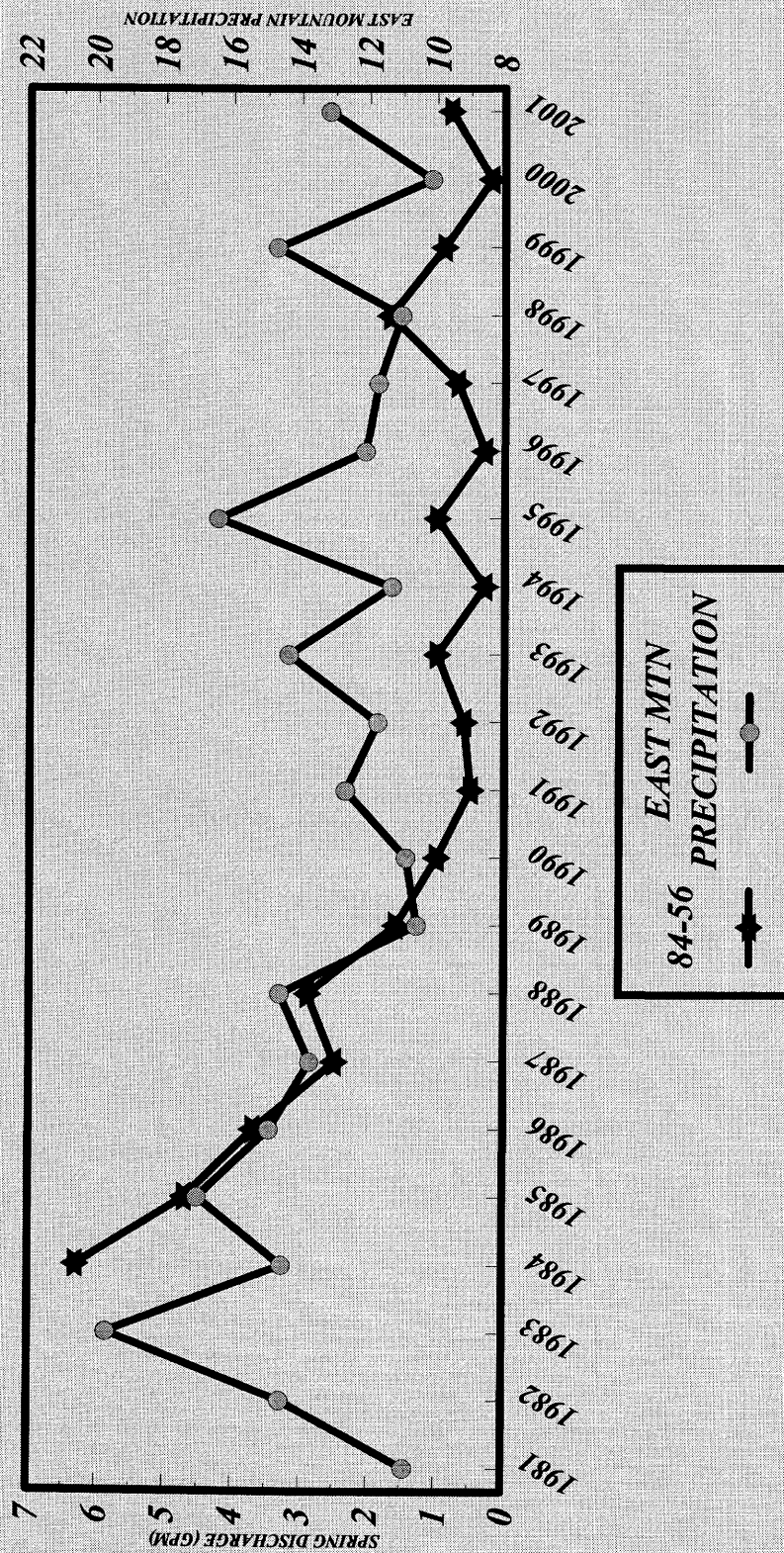
# East Mountain Springs 82-52



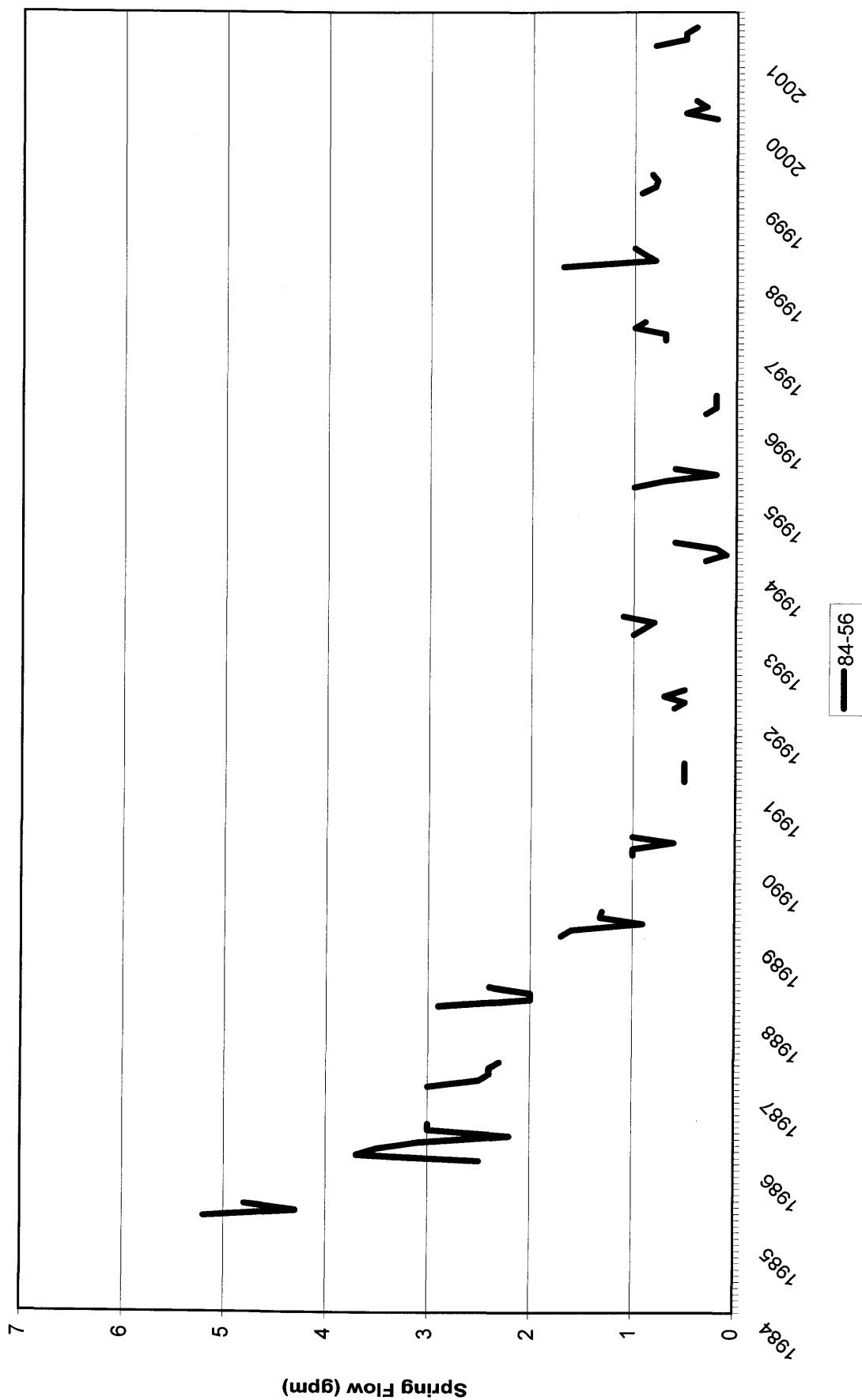
# EAST MOUNTAIN SPRINGS

## Spring: 84-56 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



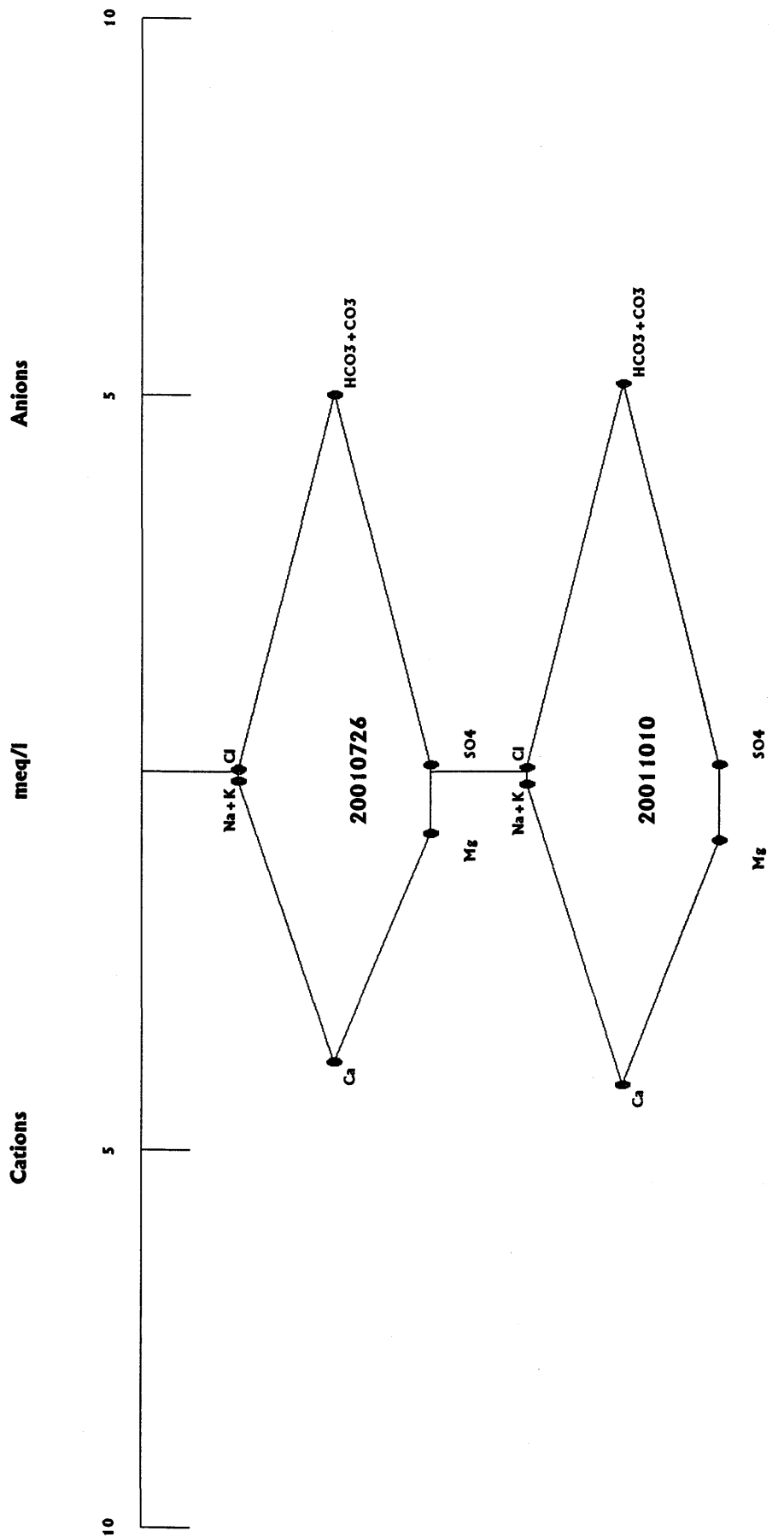
# East Mountain Springs 84-56



**EAST MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
FLAGSTAFF LIMESTONE**

# EAST MOUNTAIN SPRINGS

## SHEBA SPRINGS



# EAST MOUNTAIN SPRINGS

EMS 79-35

Anions

meq/l

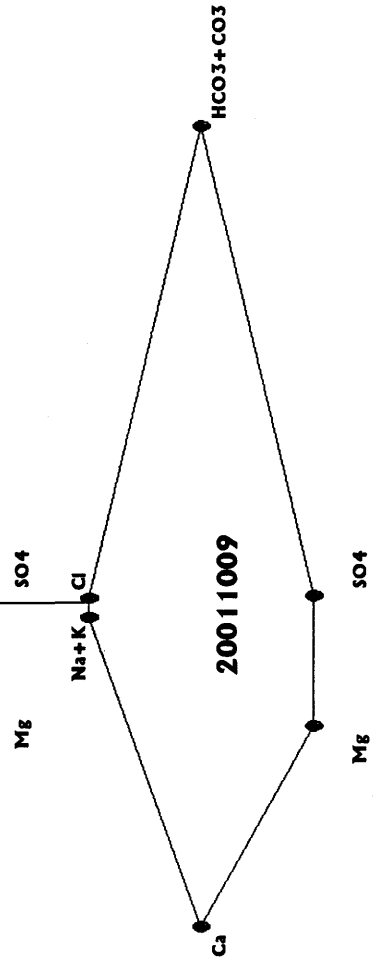
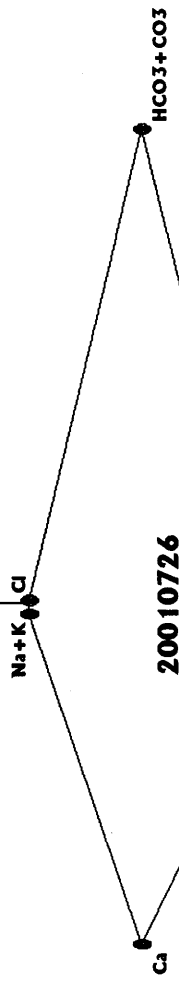
Cations

5

5

10

10

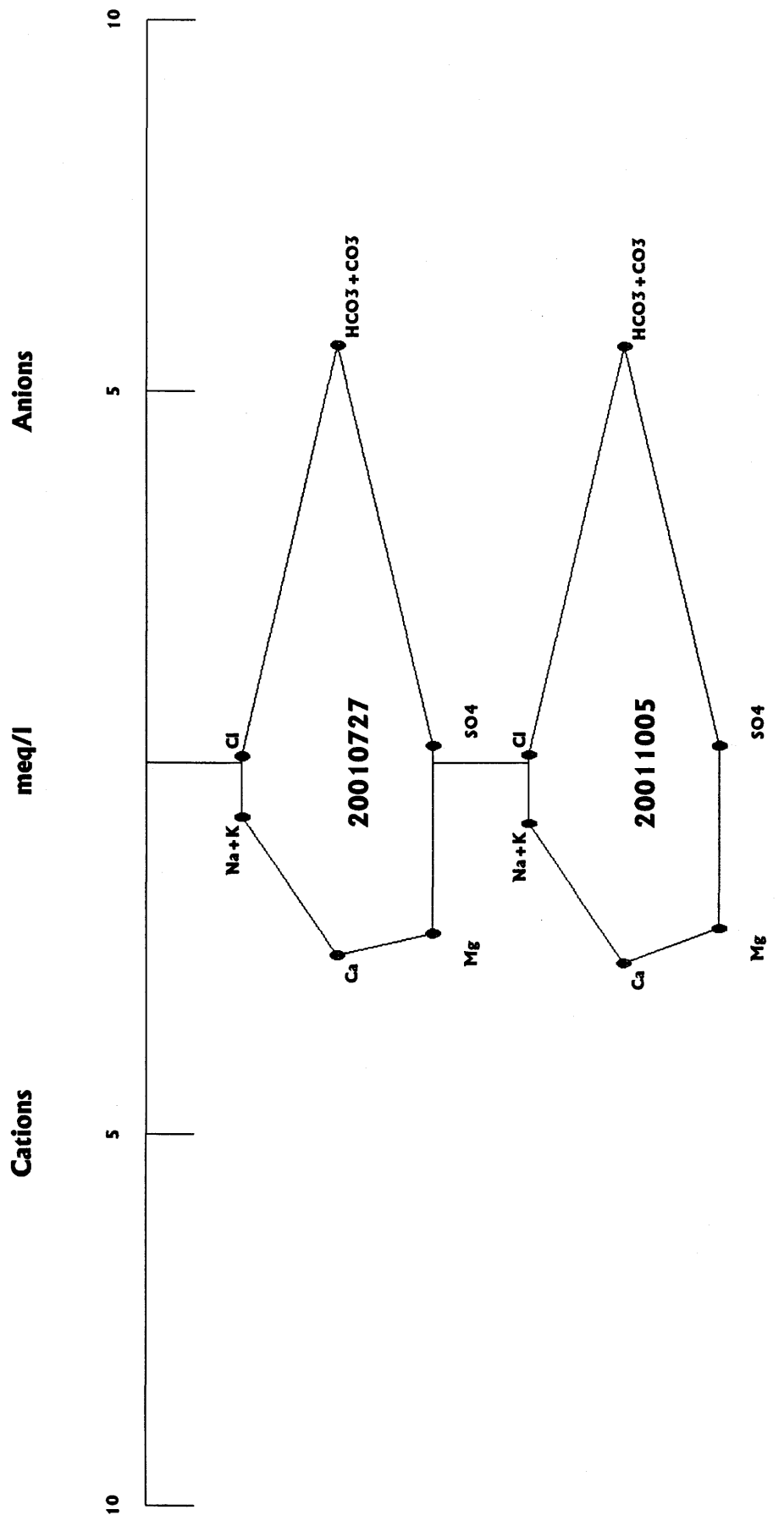


**EAST MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
NORTH HORN FORMATION**



# EAST MOUNTAIN SPRINGS

## BURNT TREE



# EAST MOUNTAIN SPRINGS

## ELK SPRING

Cations

Anions

meq/l

5

5

10

10

Na+K

Cl

Ca

20010726

Mg

SO<sub>4</sub>

HCO<sub>3</sub>+CO<sub>3</sub>

Na+K

Cl

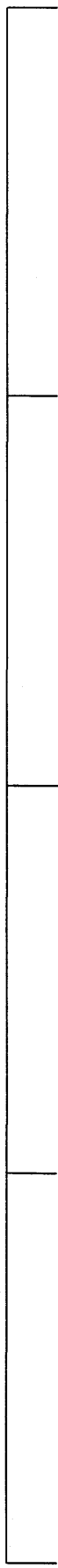
Ca

20011009

Mg

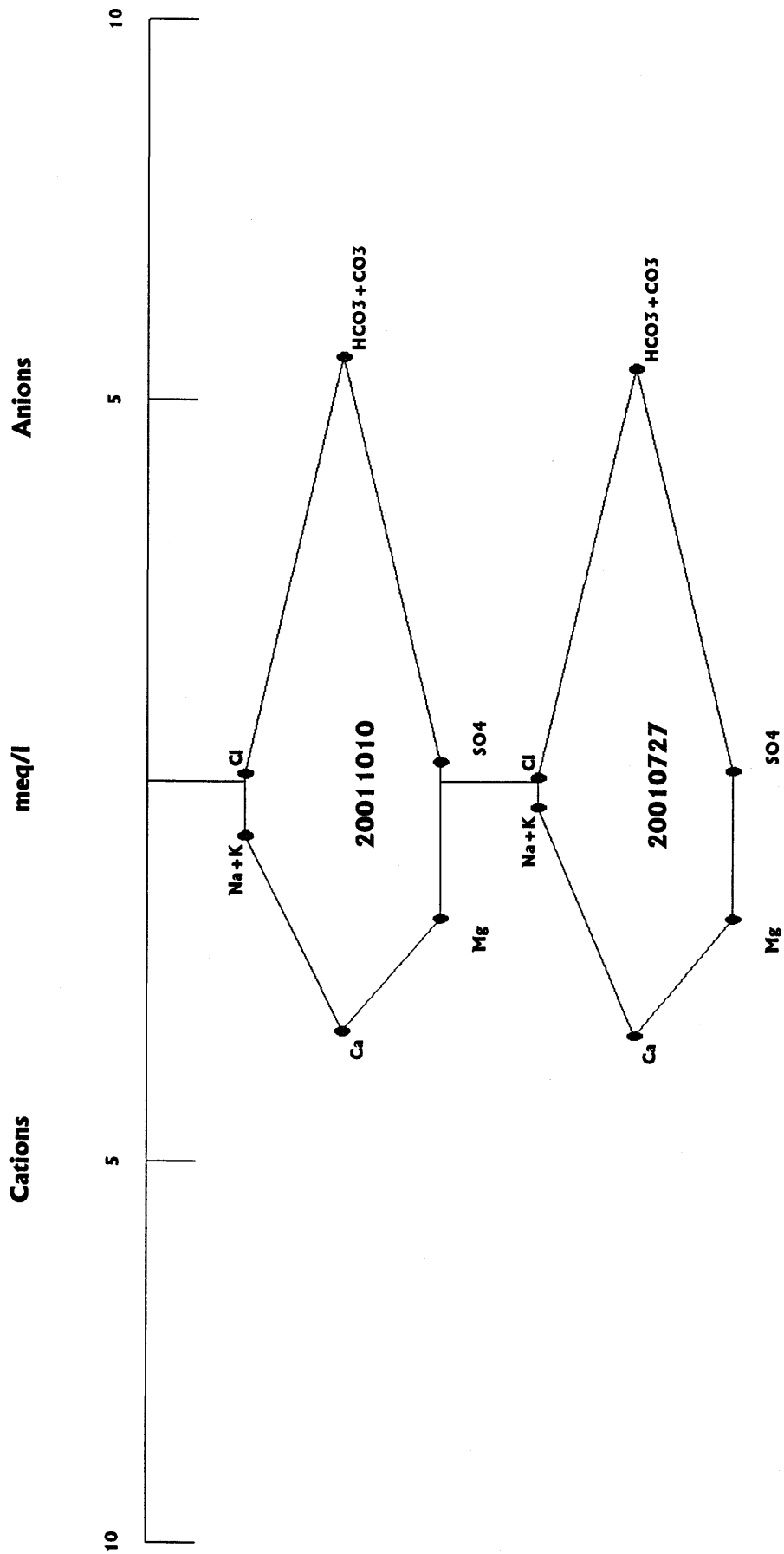
SO<sub>4</sub>

HCO<sub>3</sub>+CO<sub>3</sub>



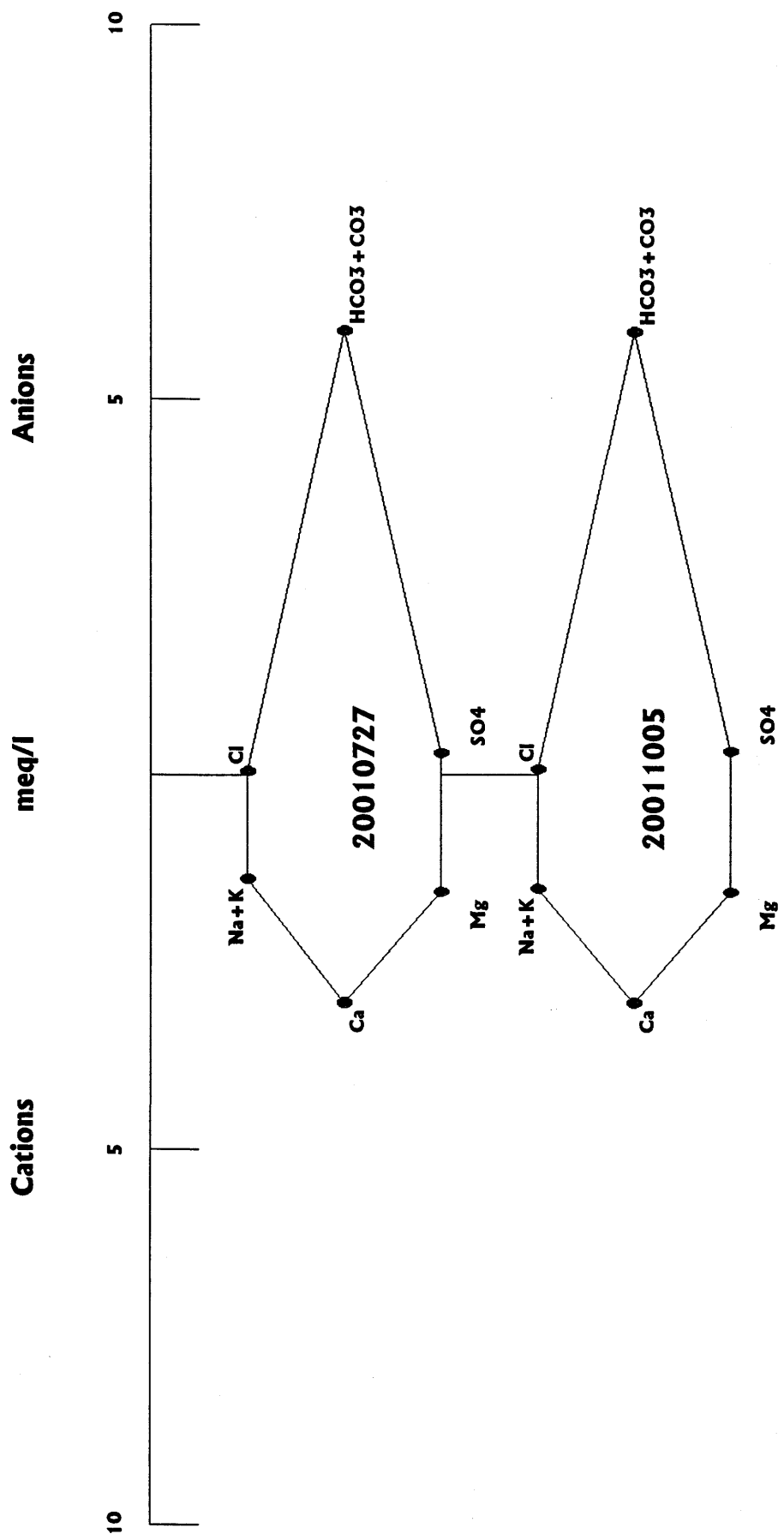
# EAST MOUNTAIN SPRINGS

## TEDS TUB



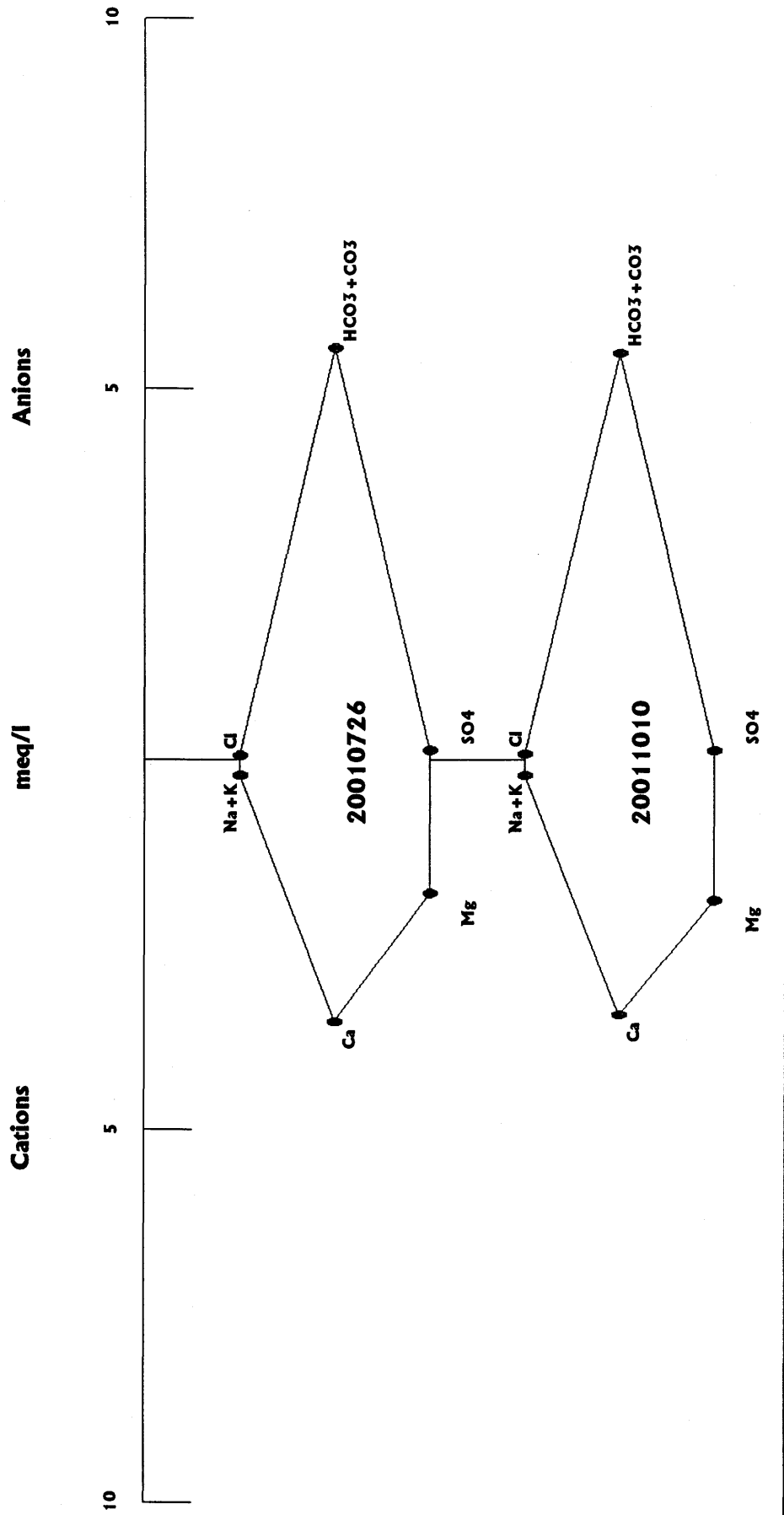
# EAST MOUNTAIN SPRINGS

EMS 79-02



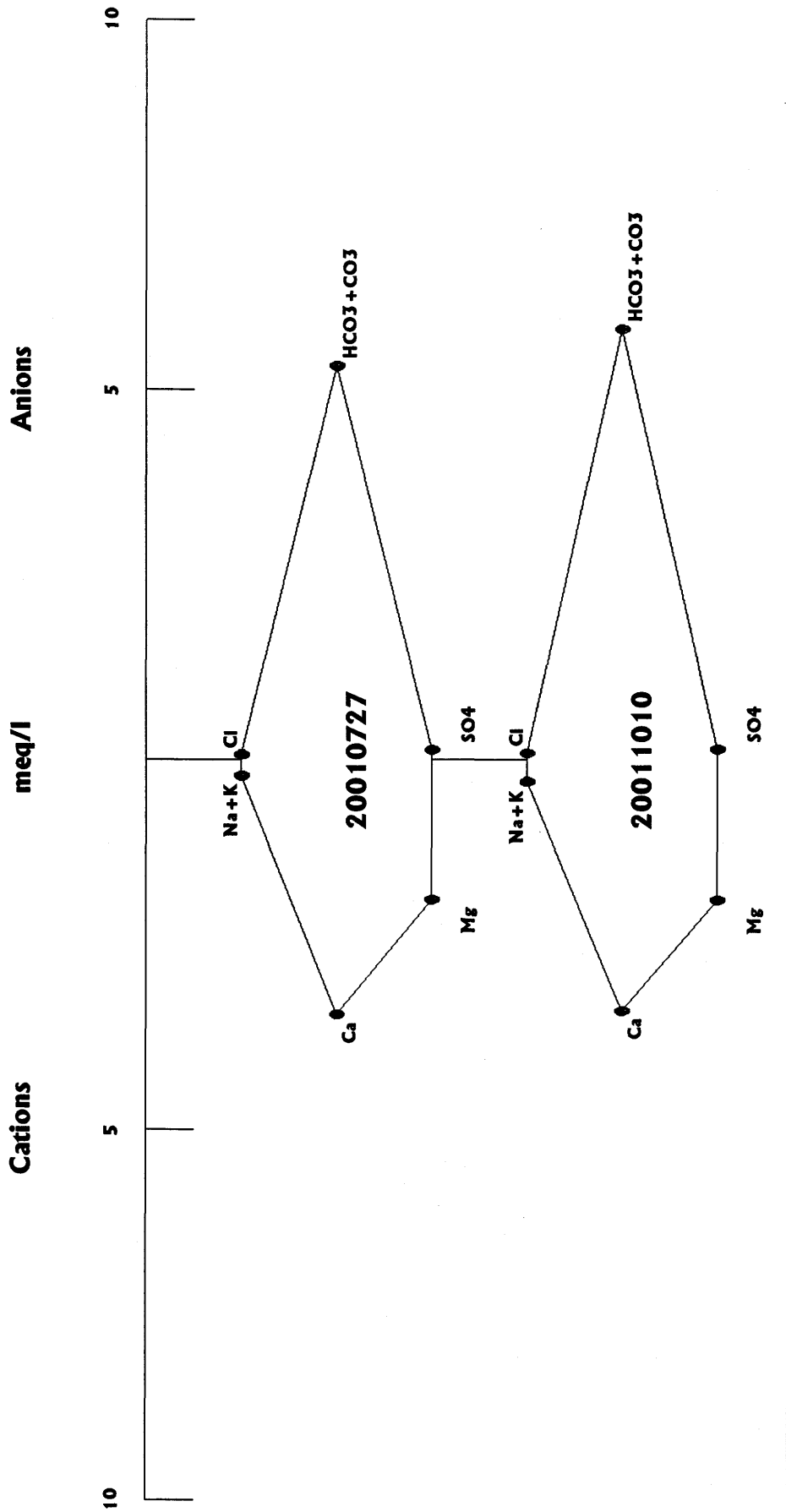
# EAST MOUNTAIN SPRINGS

EMS 79-10



# EAST MOUNTAIN SPRINGS

EMS 79-15



# EAST MOUNTAIN SPRINGS

EMS 79-26

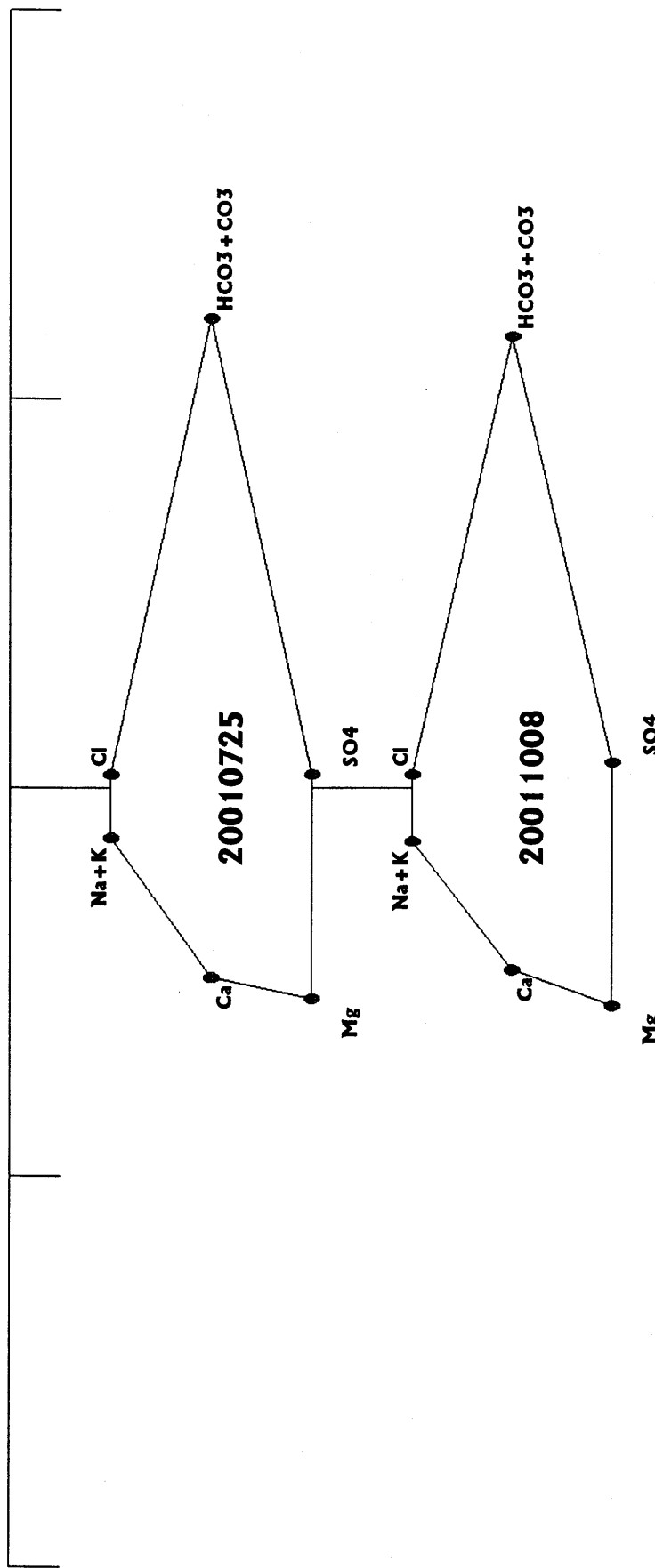
Cations

meq/l

Anions

10  
5

5  
10



# EAST MOUNTAIN SPRINGS

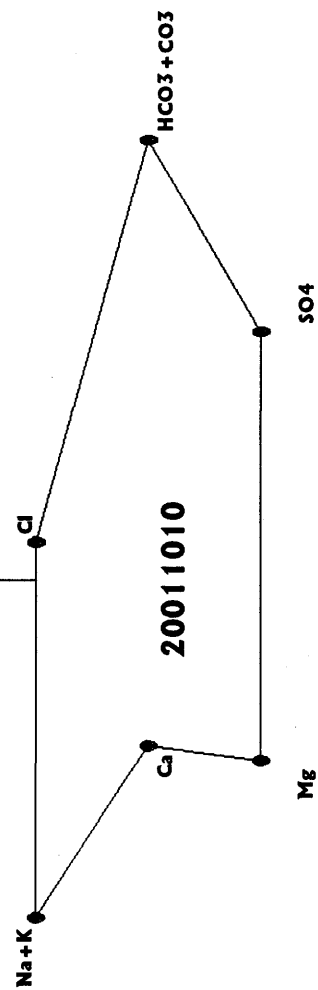
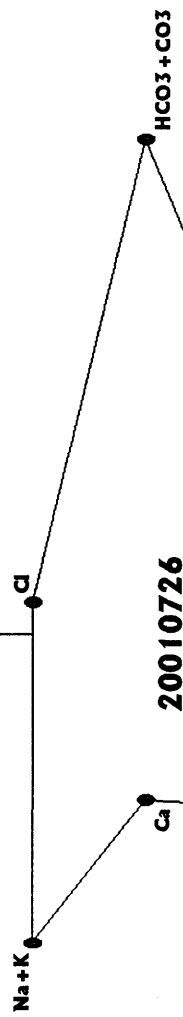
EMS 79-28

Anions

meq/l

Cations

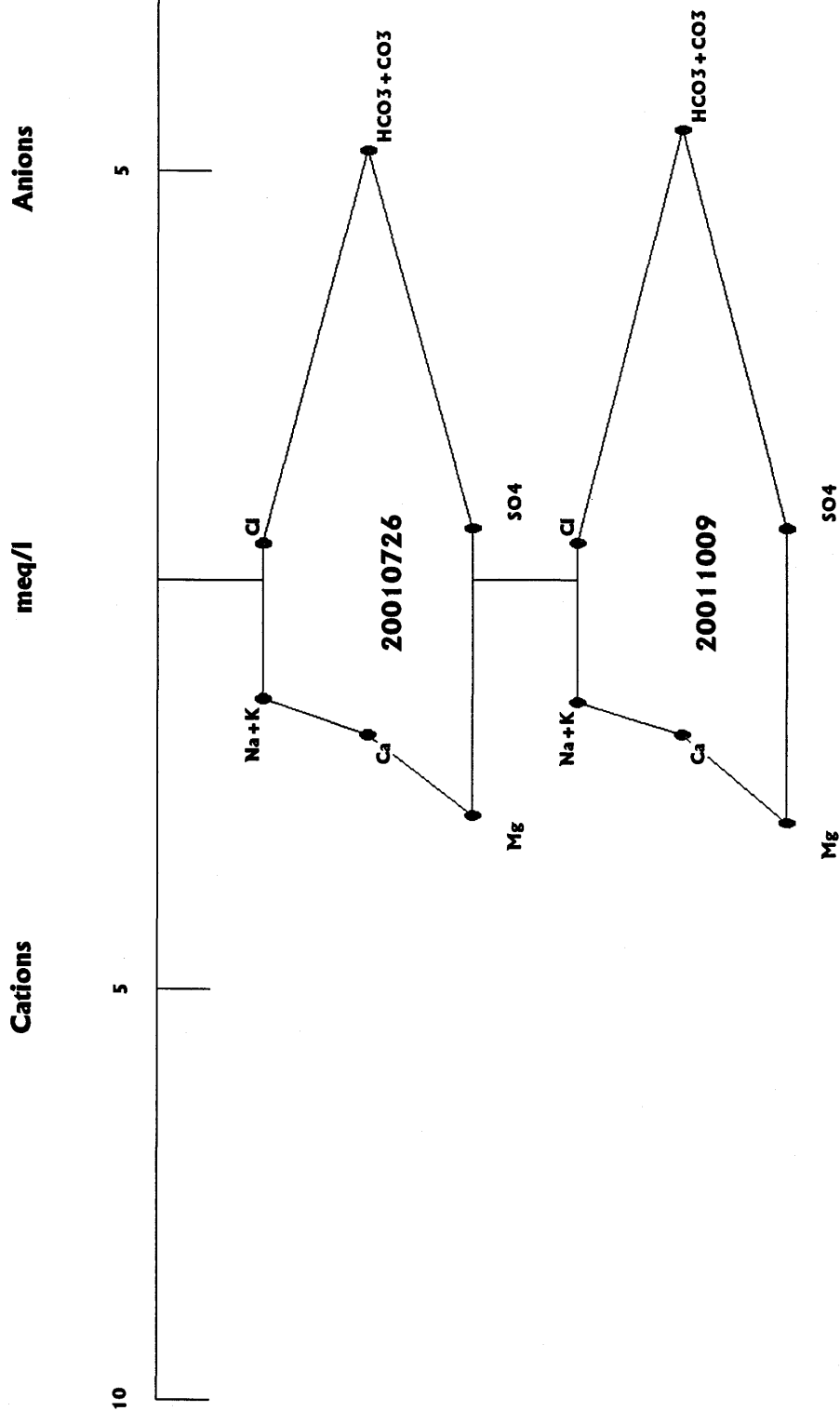
10 5 10 5





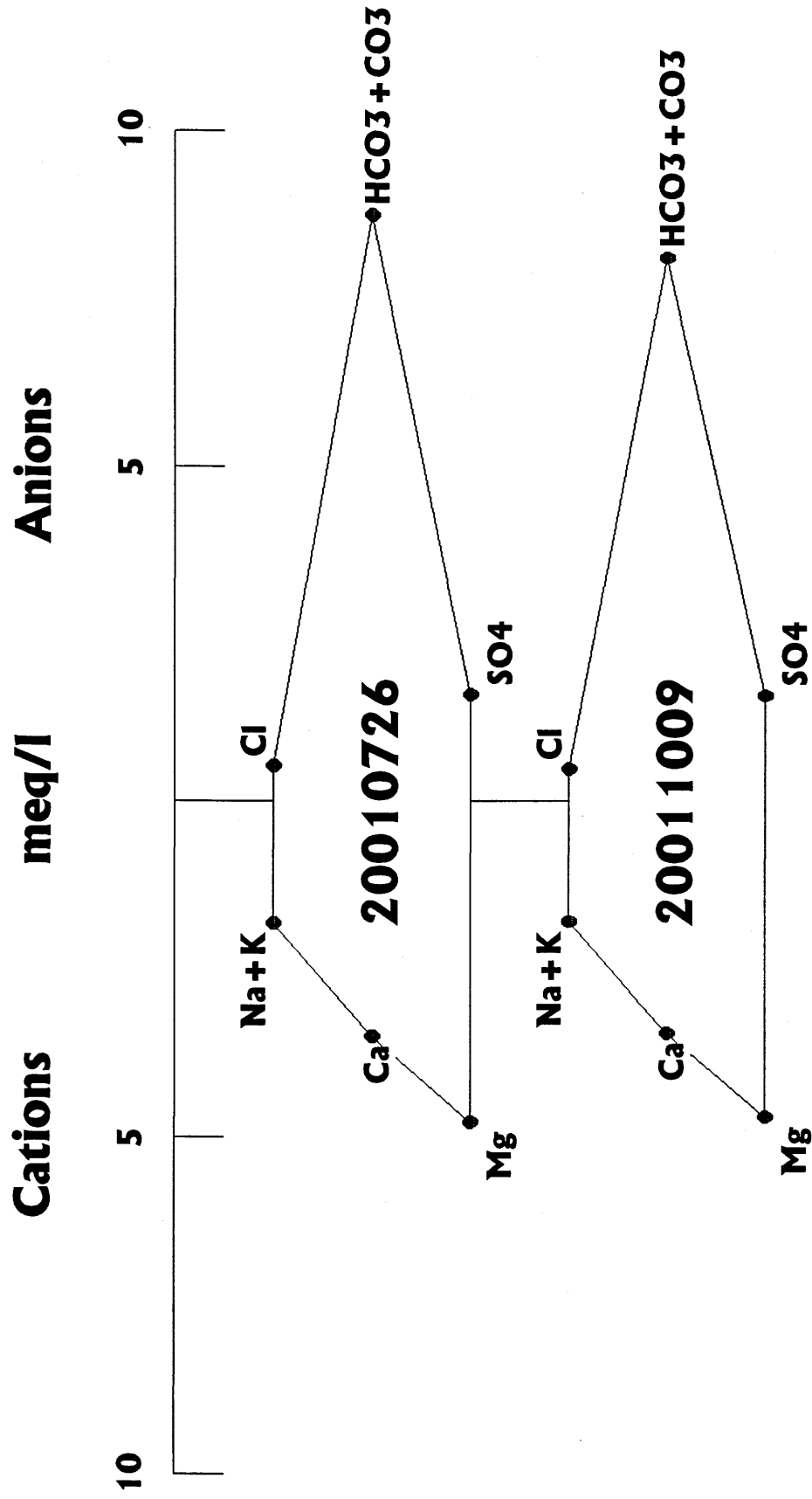
# EAST MOUNTAIN SPRINGS

EMS 79-29



# EAST MOUNTAIN SPRINGS

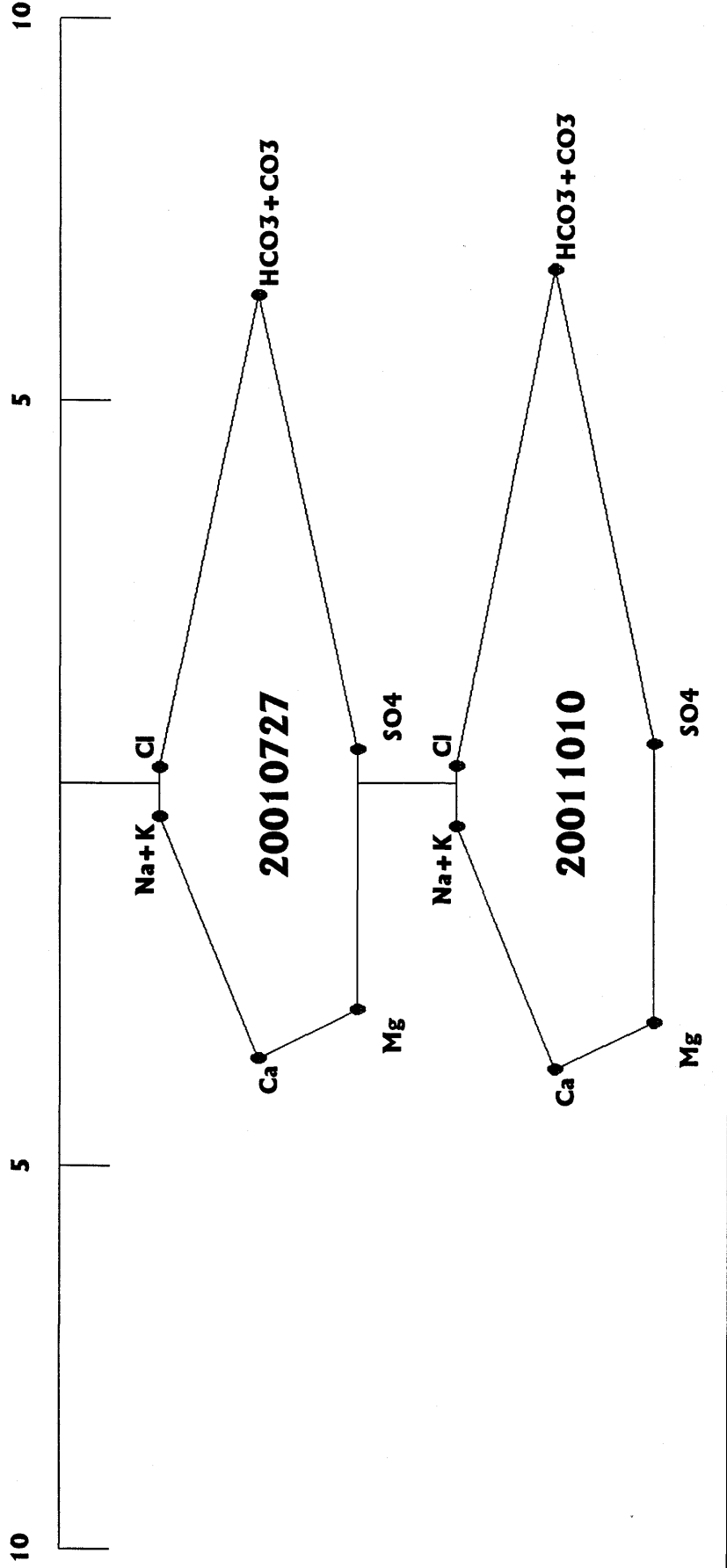
EMS 79-32



# EAST MOUNTAIN SPRINGS

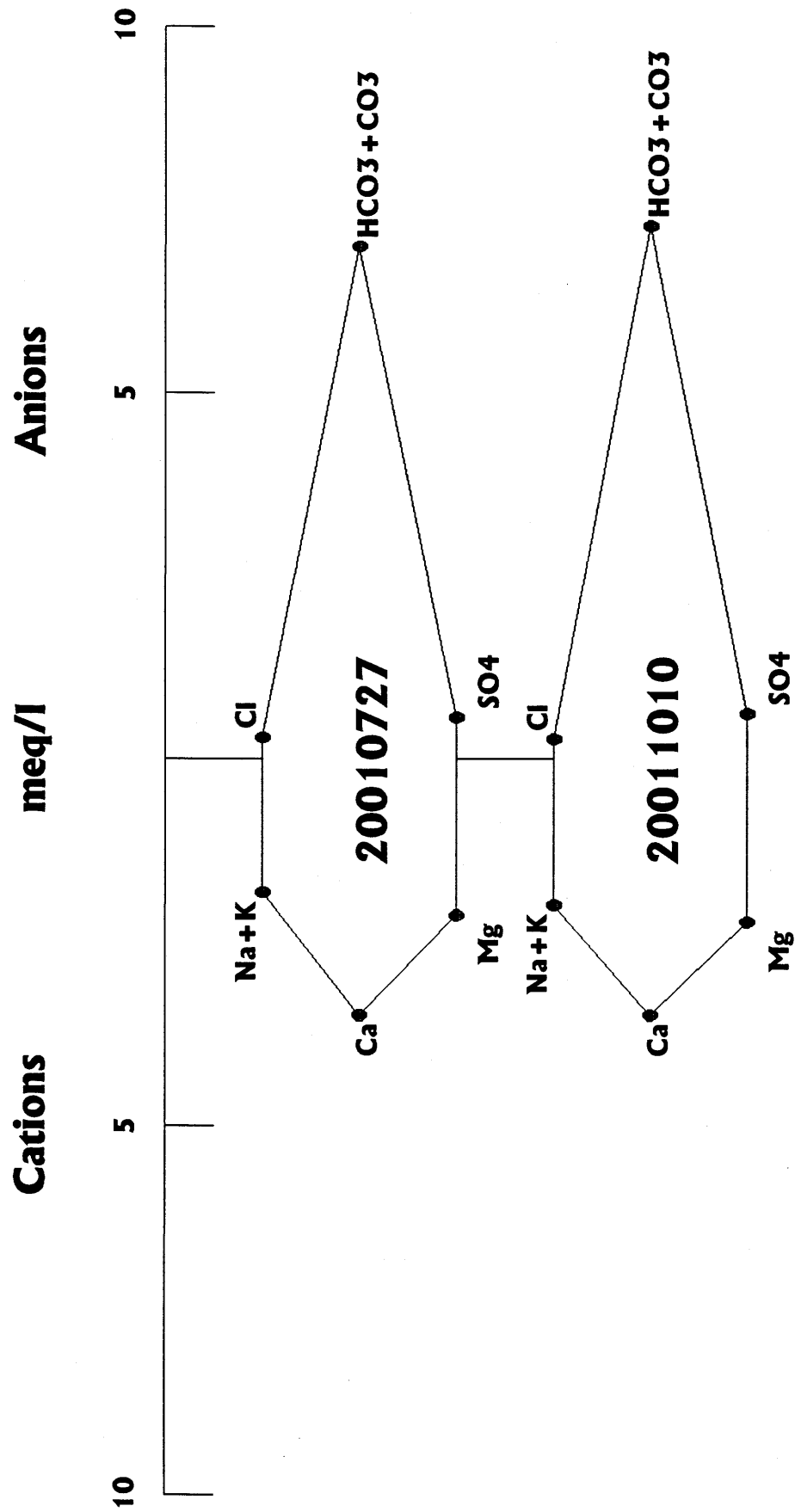
EMS 79-34

Cations                      meq/l                      Anions



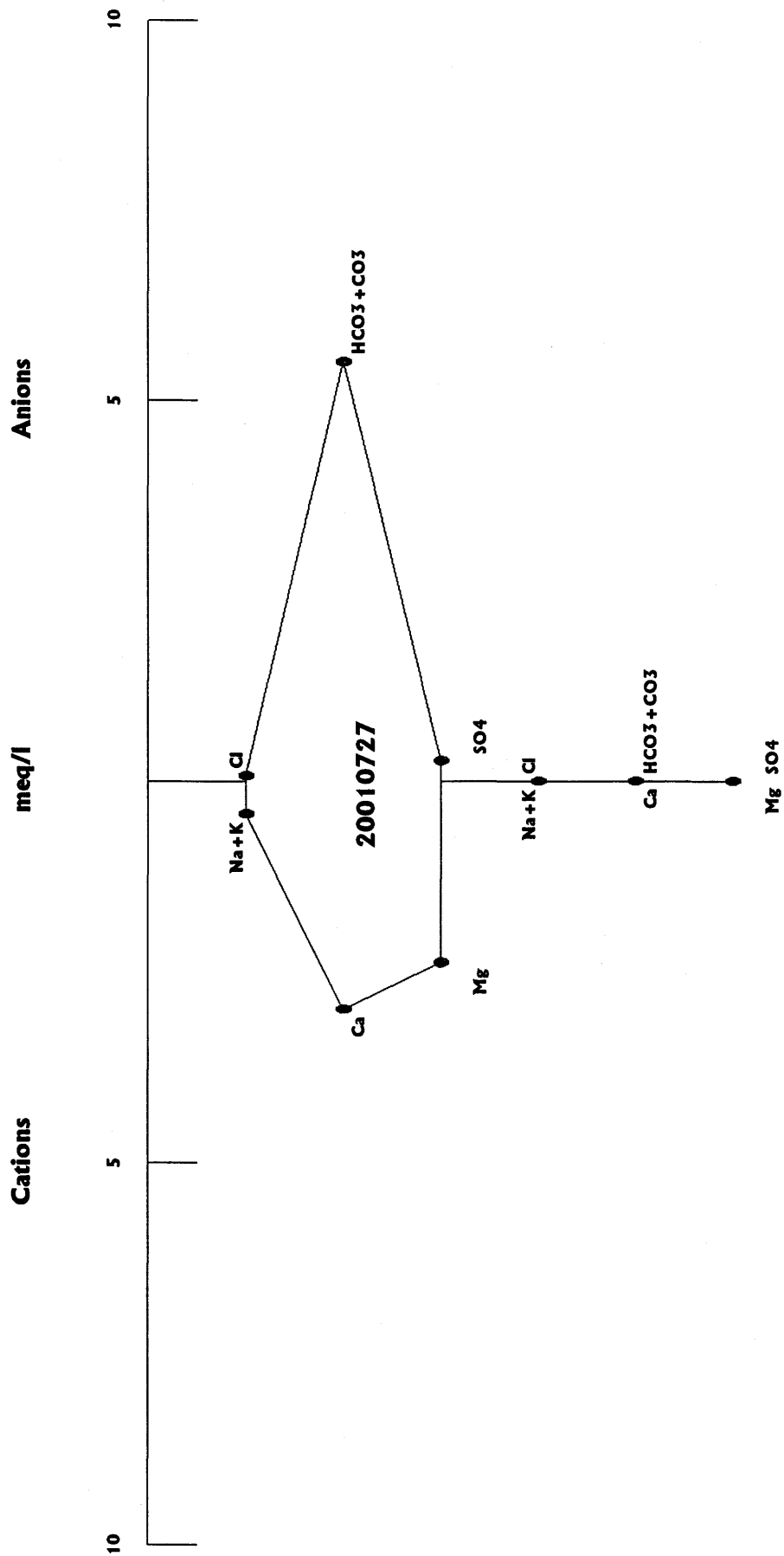
# EAST MOUNTAIN SPRINGS

EMS 79-38



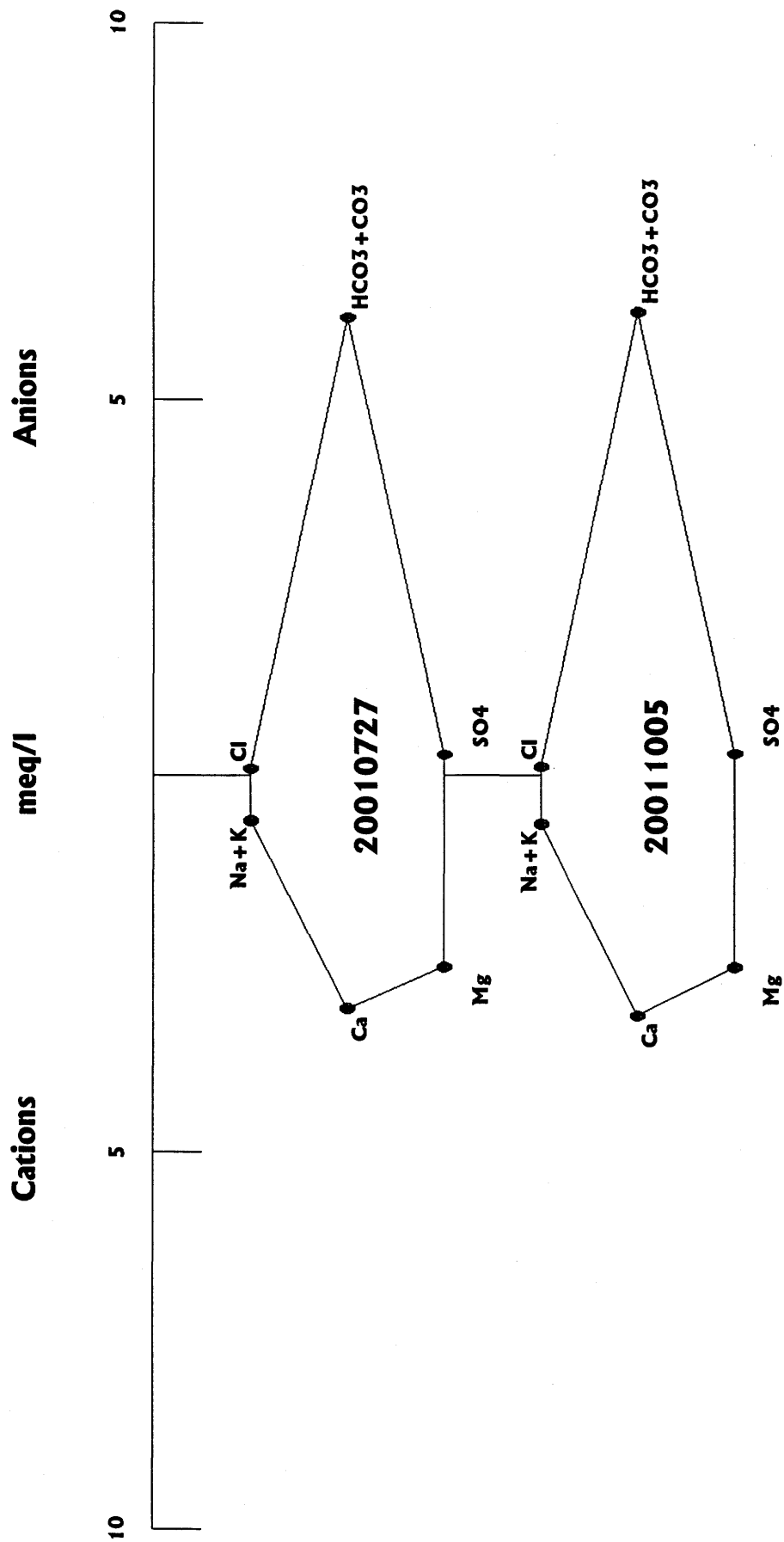
# EAST MOUNTAIN SPRINGS

EMS 80-46



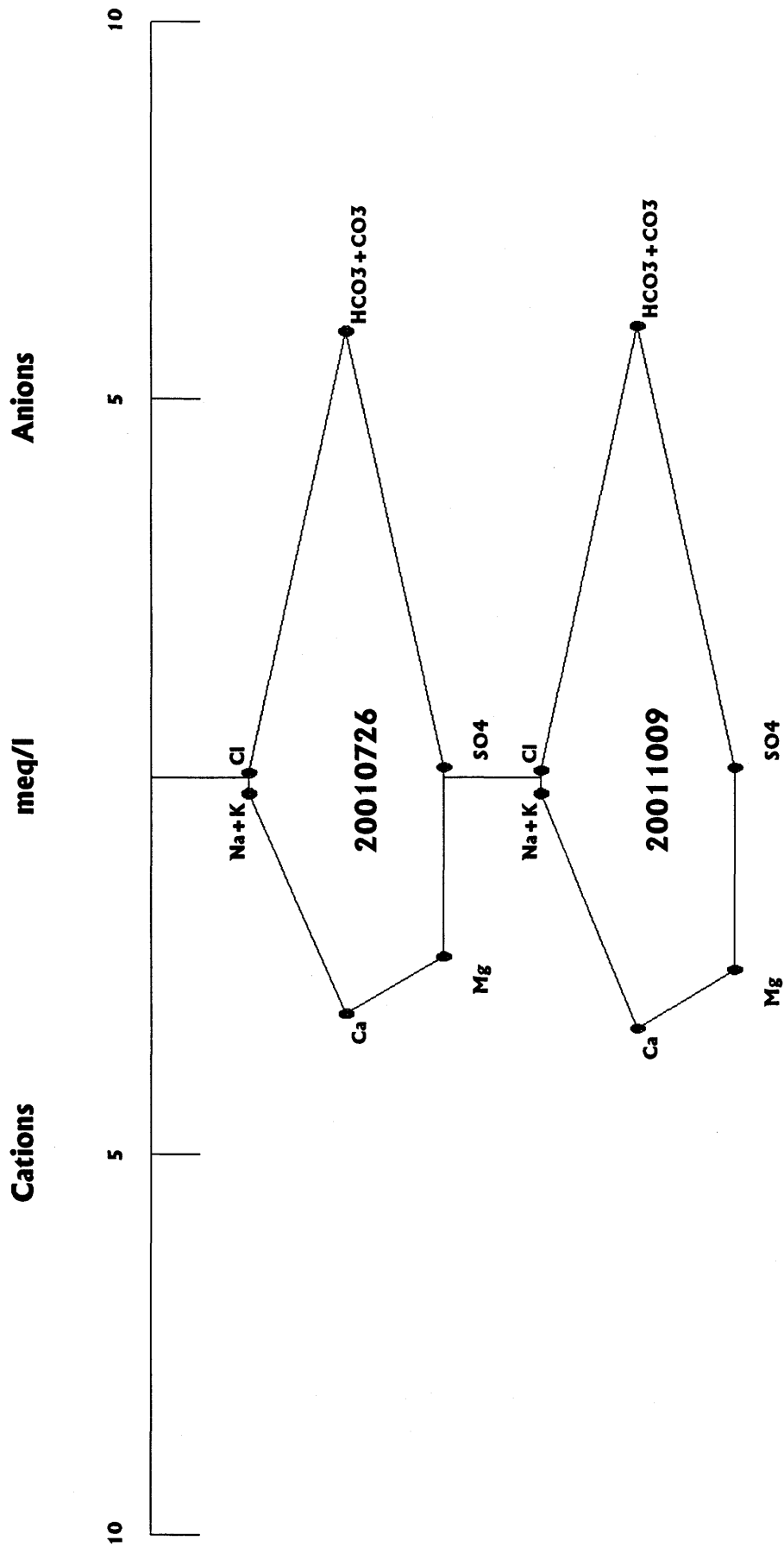
# EAST MOUNTAIN SPRINGS

EMS 80-47



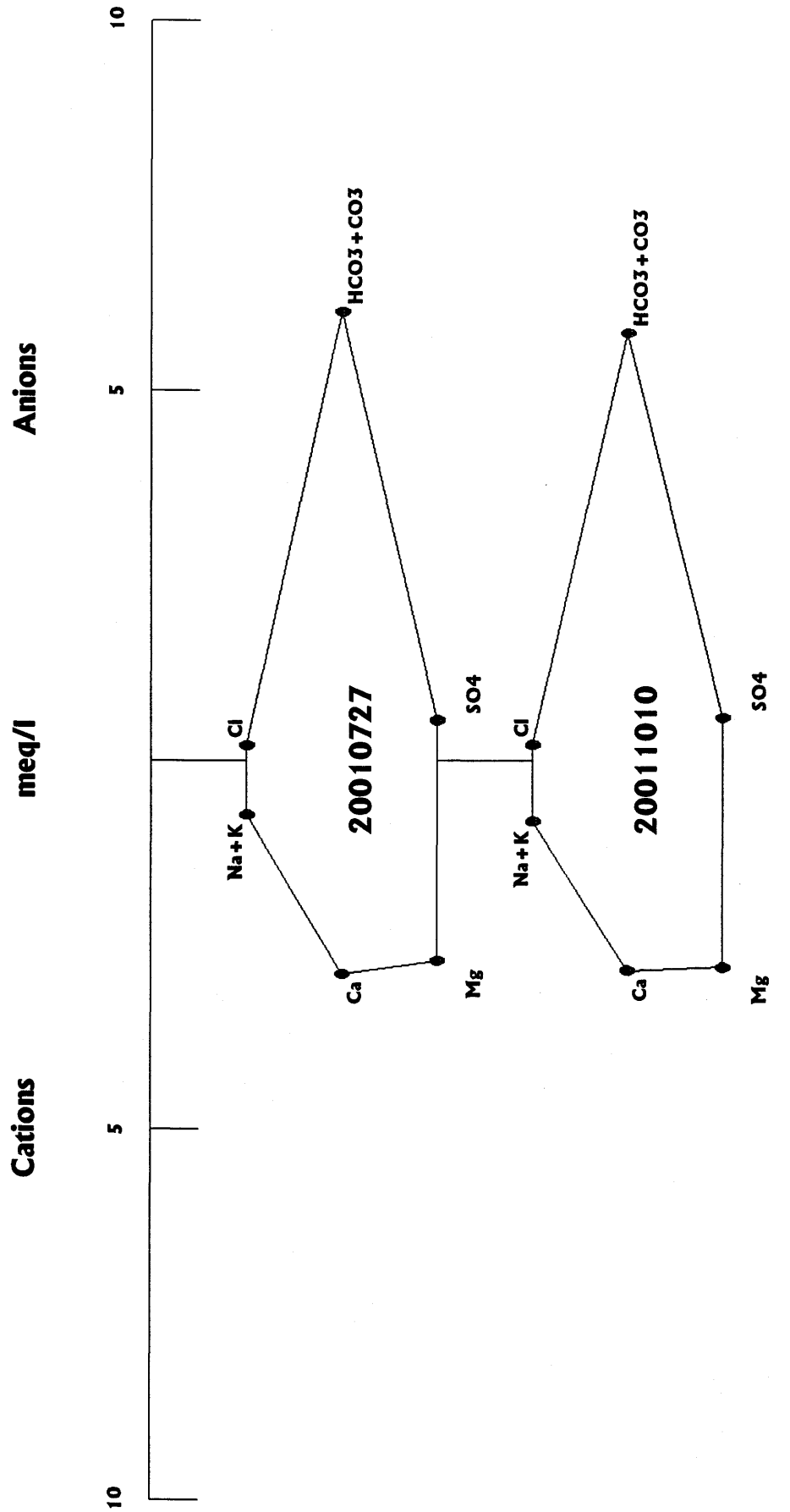
# EAST MOUNTAIN SPRINGS

EMS 80-48



# EAST MOUNTAIN SPRINGS

EMS 84-56

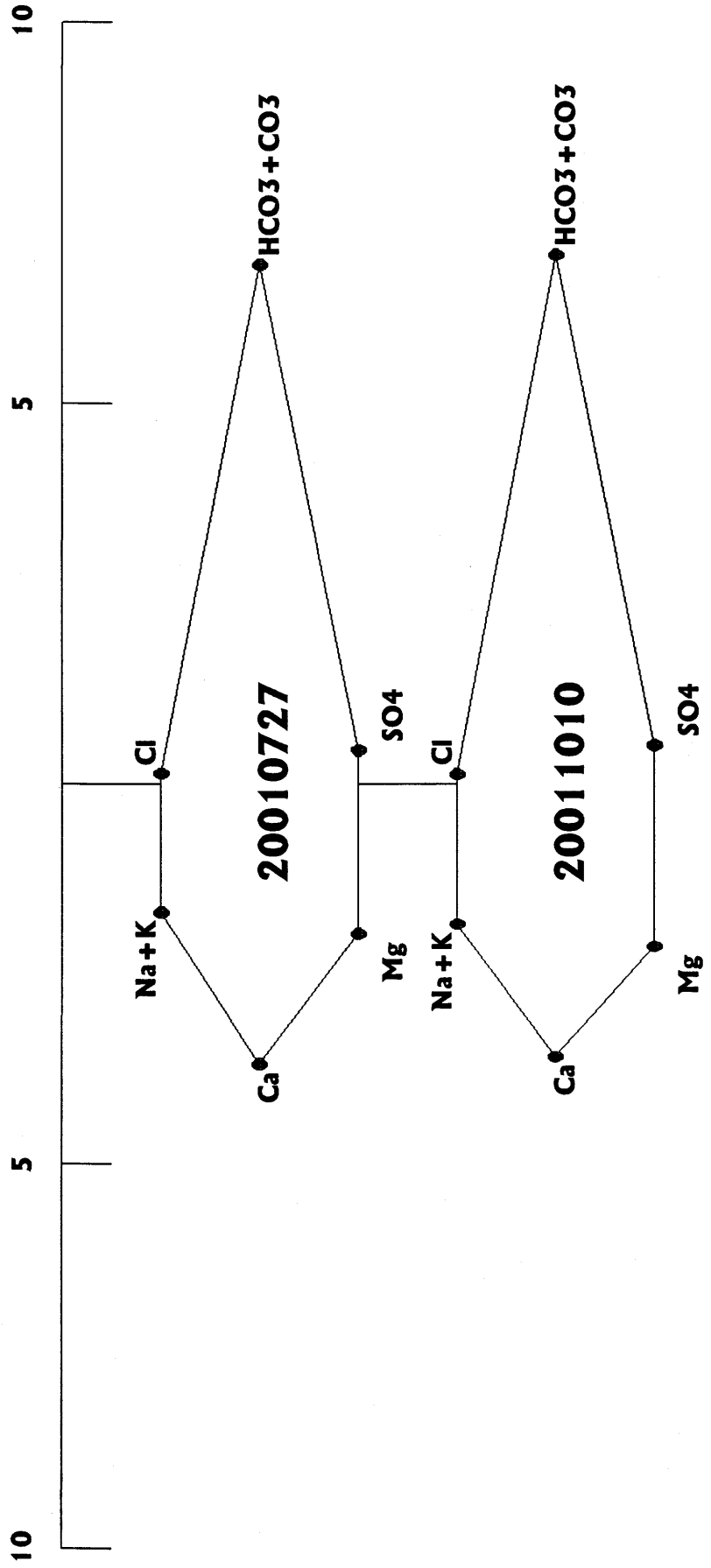




# EAST MOUNTAIN SPRINGS

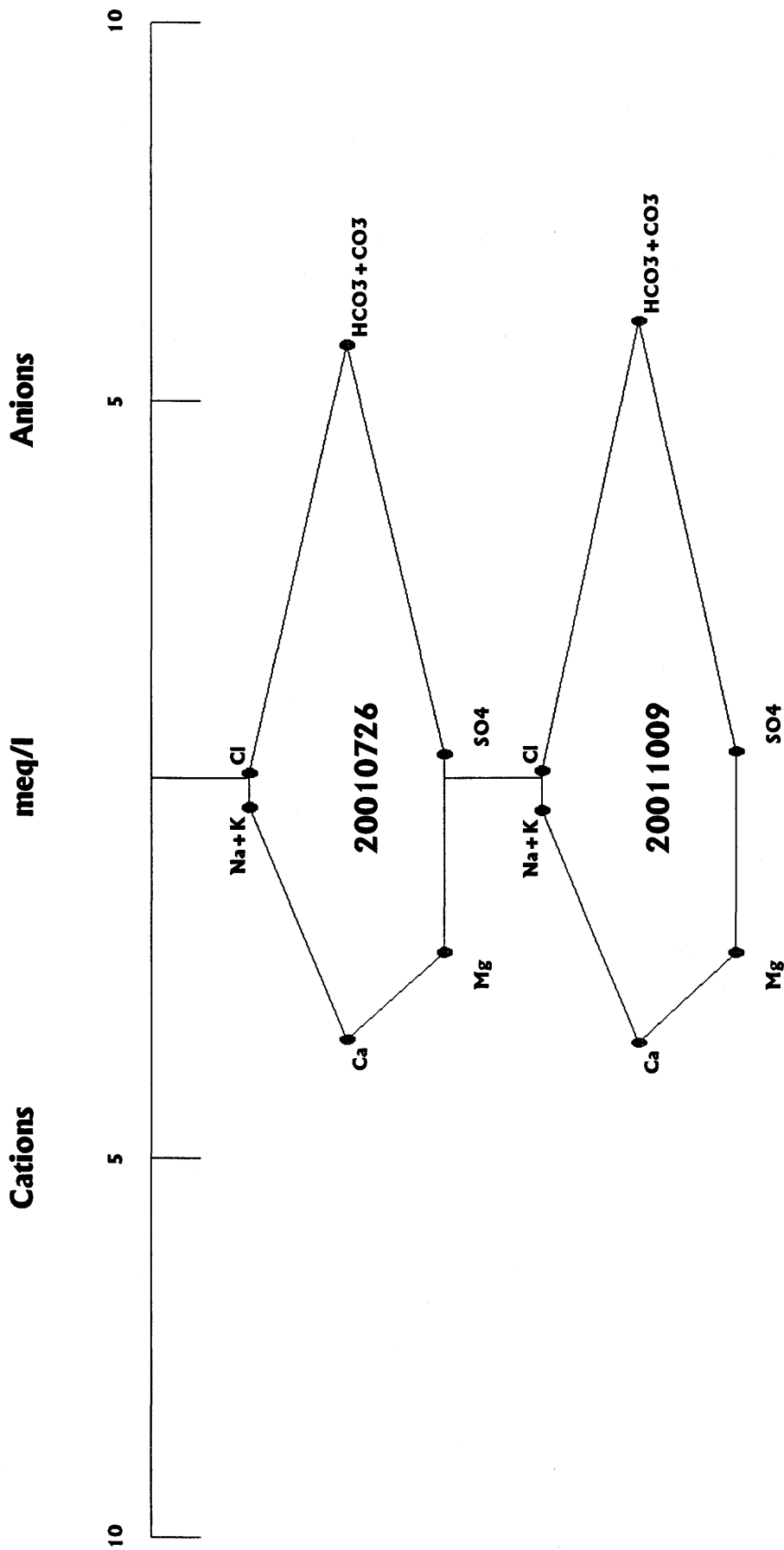
EMS 89-60

Cations                      meq/l                      Anions

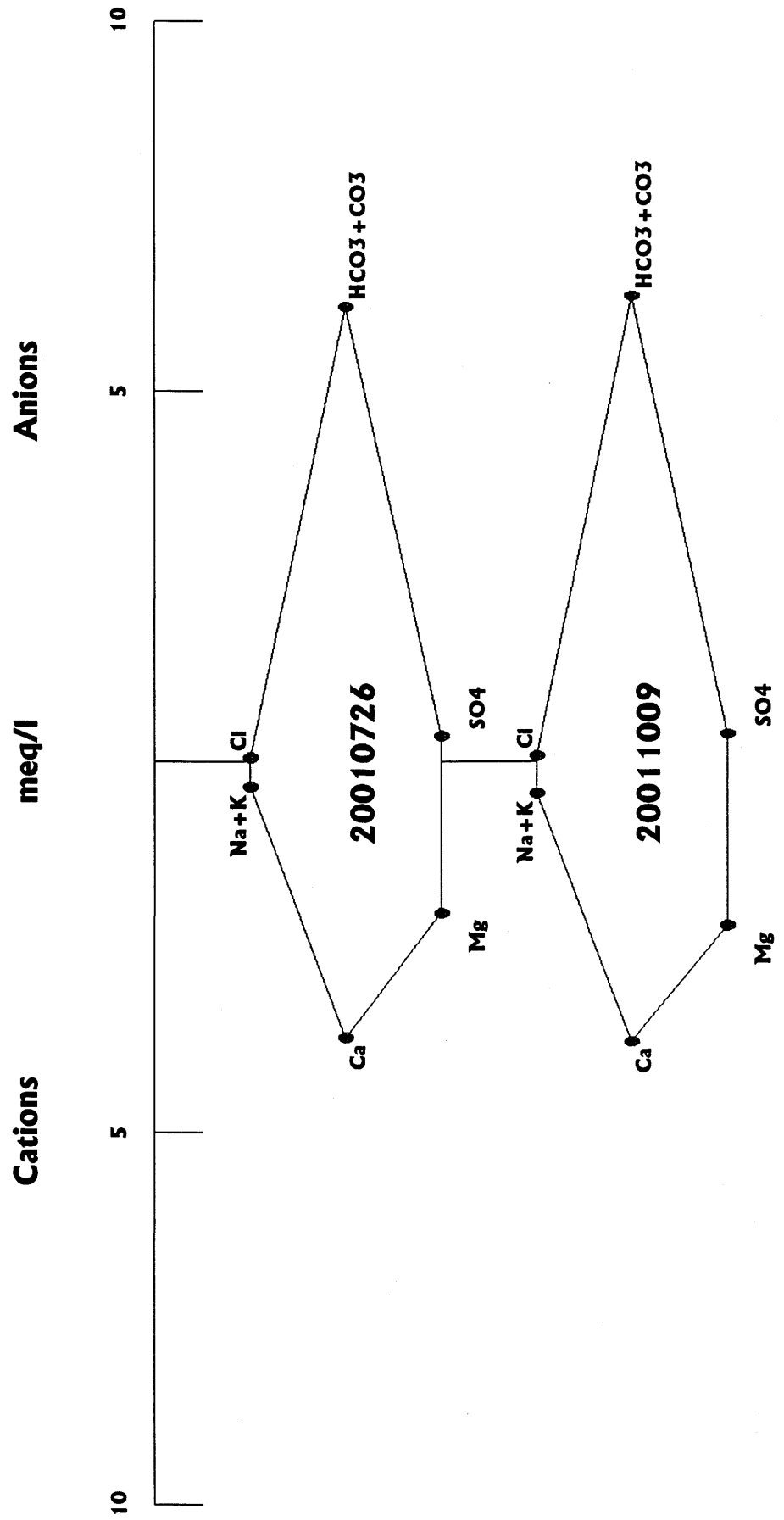


# EAST MOUNTAIN SPRINGS

EMS 89-61



# EMS 89-65



# EAST MOUNTAIN SPRINGS

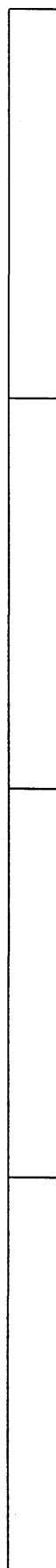
EMS 89-66

Cations

meq/l

Anions

10 5 10 5



Na+K Cl

20010726

HCO<sub>3</sub>+CO<sub>3</sub>

Mg

SO<sub>4</sub>

Na+K Cl

Ca HCO<sub>3</sub>+CO<sub>3</sub>

Mg SO<sub>4</sub>

# EAST MOUNTAIN SPRINGS

EMS 89-67

Cations

meq/l

Anions

10

5

10

5

Na+K

Cl

20010726

Ca

Mg

SO<sub>4</sub>

HCO<sub>3</sub>+CO<sub>3</sub>

Na+K

Cl

20011009

Ca

Mg

SO<sub>4</sub>

HCO<sub>3</sub>+CO<sub>3</sub>

# EAST MOUNTAIN SPRINGS

EMS 89-68

Cations

meq/l

Anions

10  
5

5  
10

Na+K  
Cl

Ca

Mg

20010726

HCO<sub>3</sub>+CO<sub>3</sub>

SO<sub>4</sub>

Na+K  
Cl

Ca

Mg

20011009

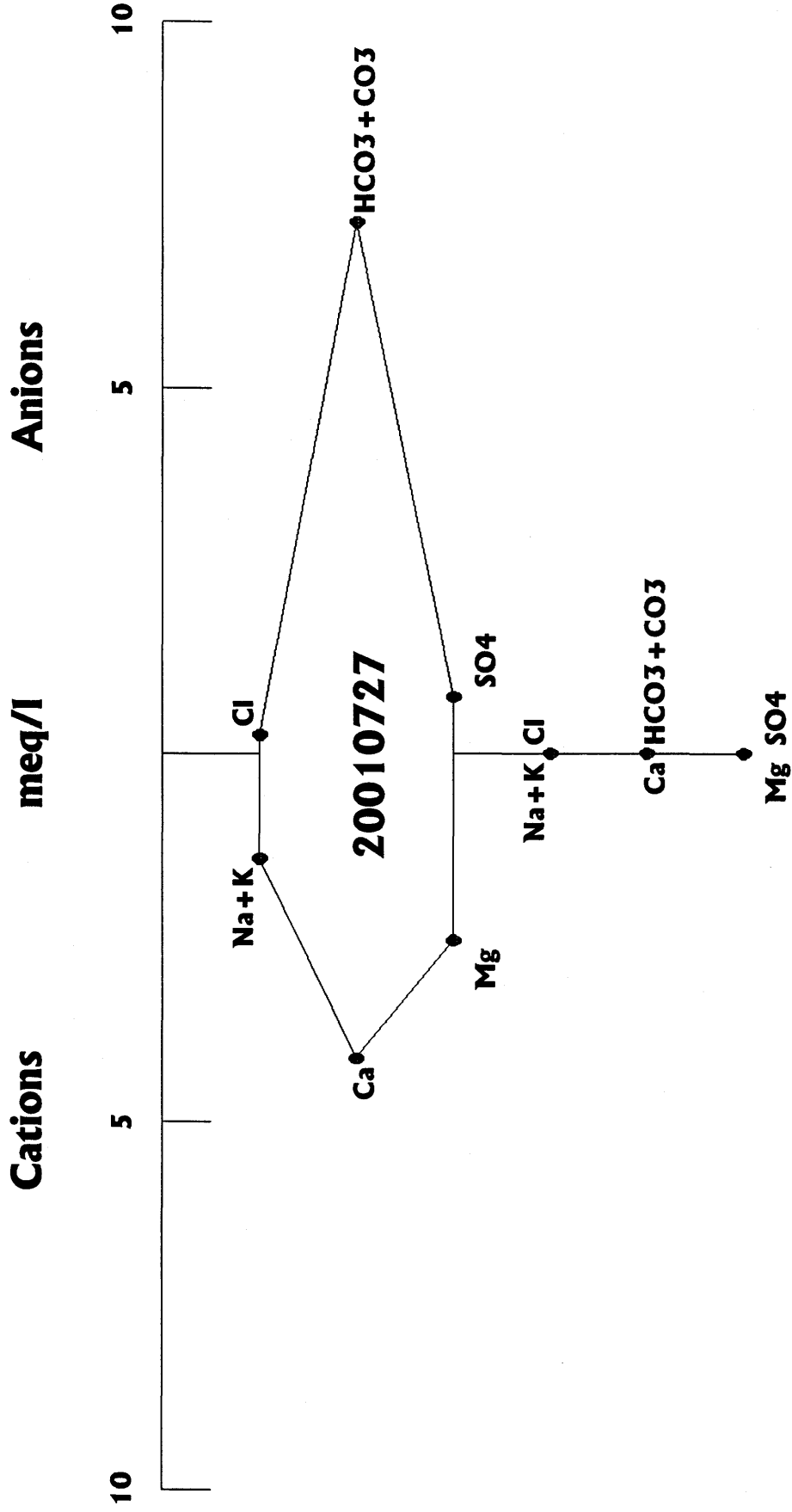
HCO<sub>3</sub>+CO<sub>3</sub>

SO<sub>4</sub>

**EAST MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
PRICE RIVER FORMATION**

# EAST MOUNTAIN SPRINGS

EMS 79-40

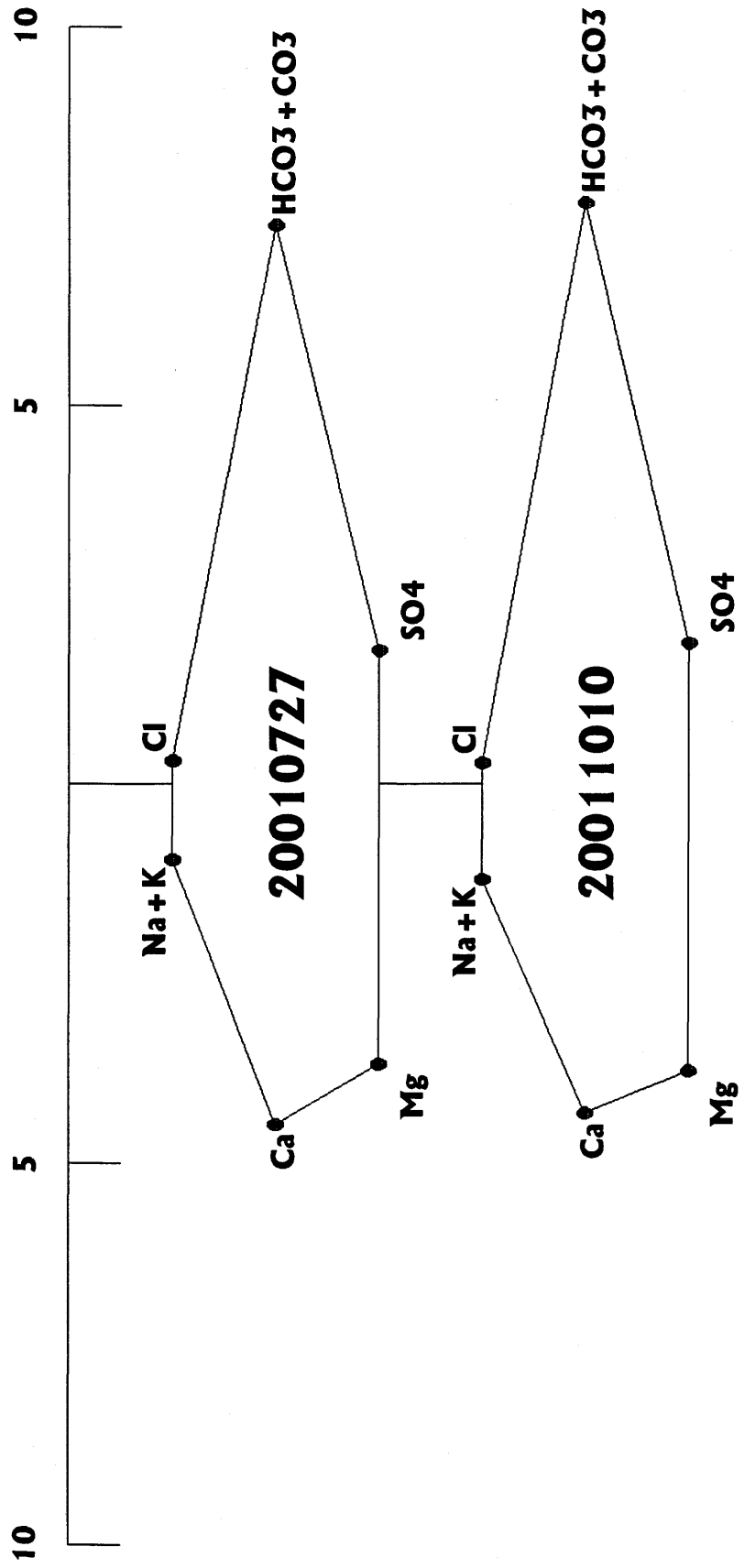




# EAST MOUNTAIN SPRINGS

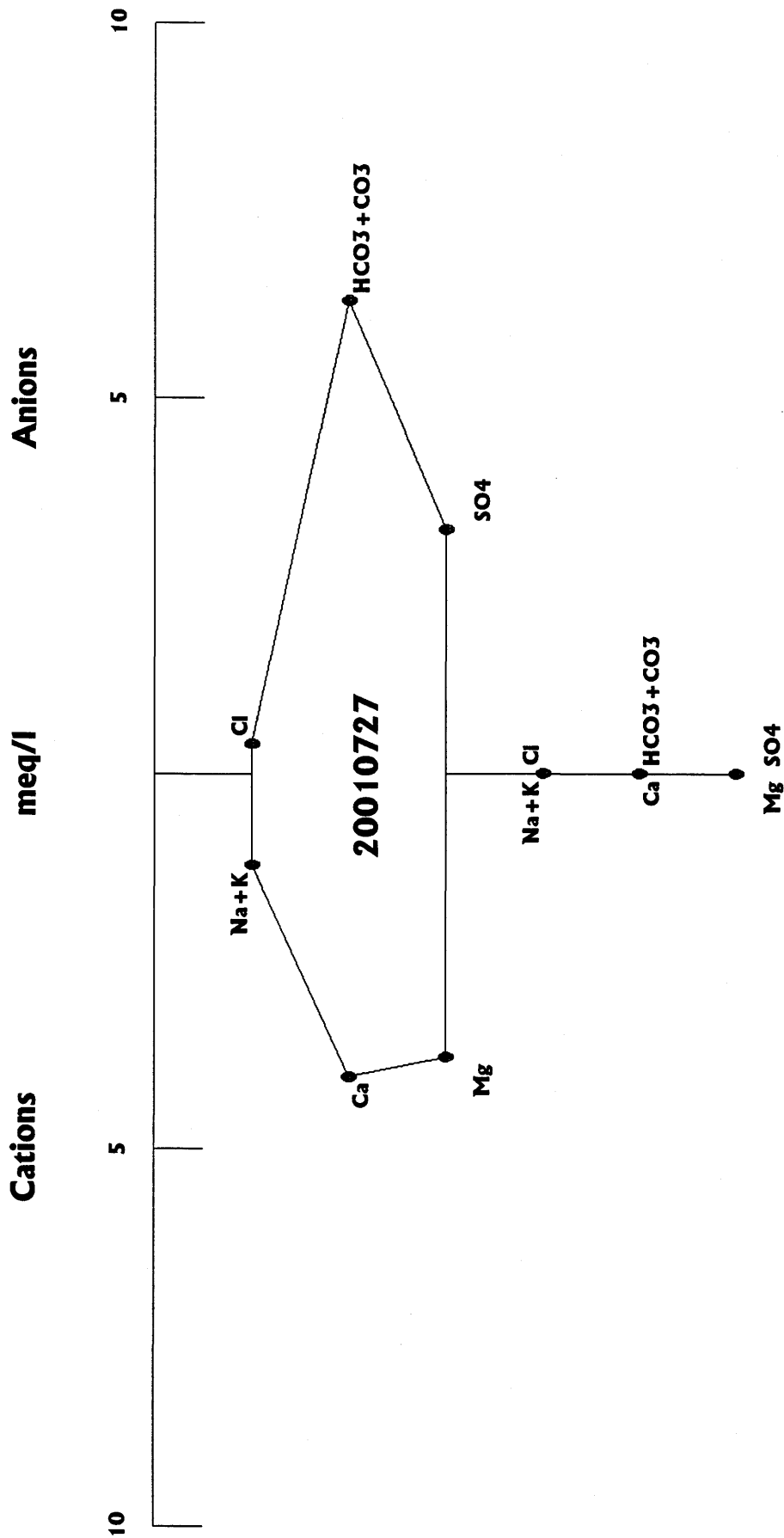
EMS 80-41

Cations meq/l Anions



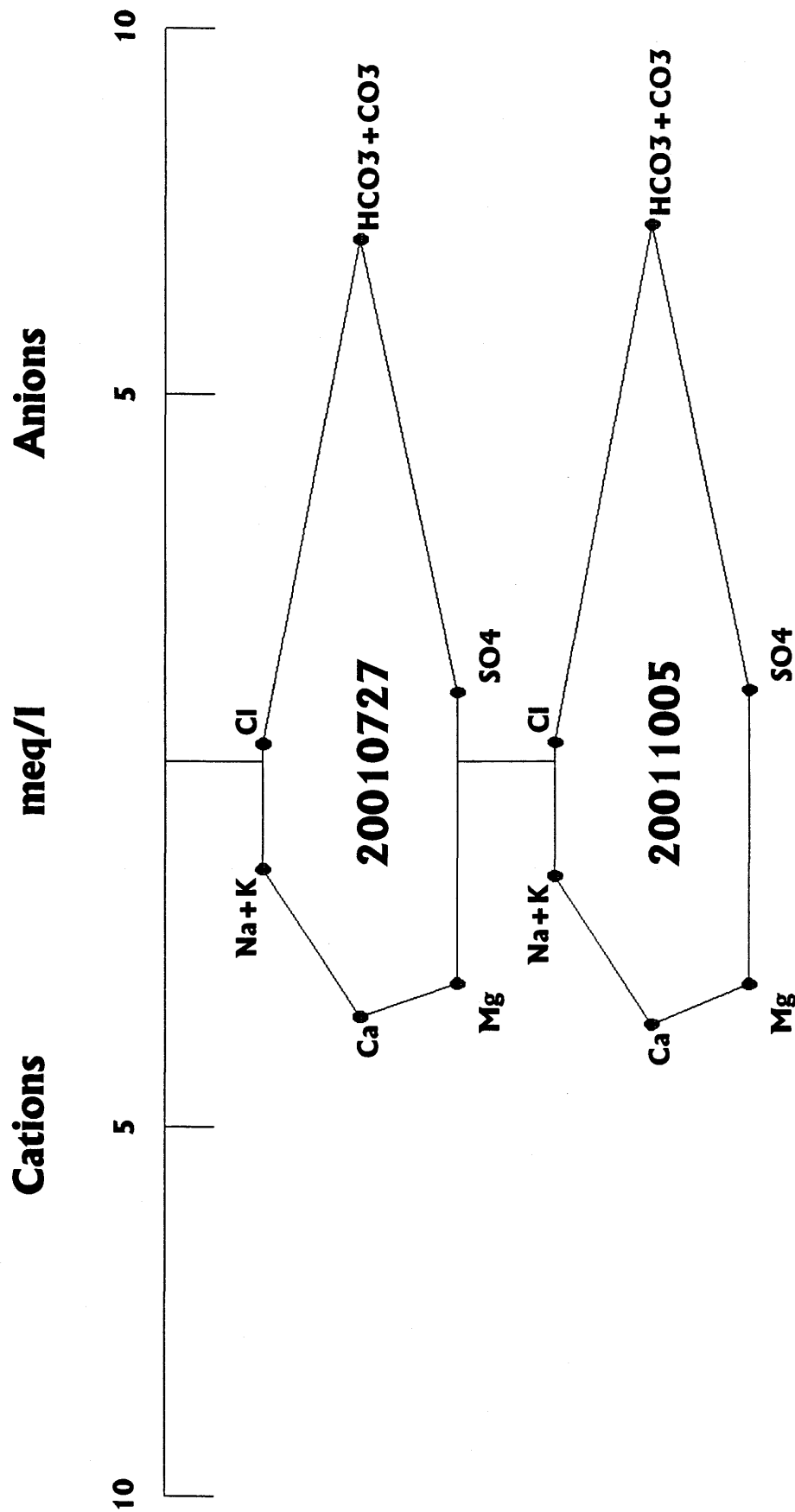
# EAST MOUNTAIN SPRINGS

EMS 82-51



# EAST MOUNTAIN SPRINGS

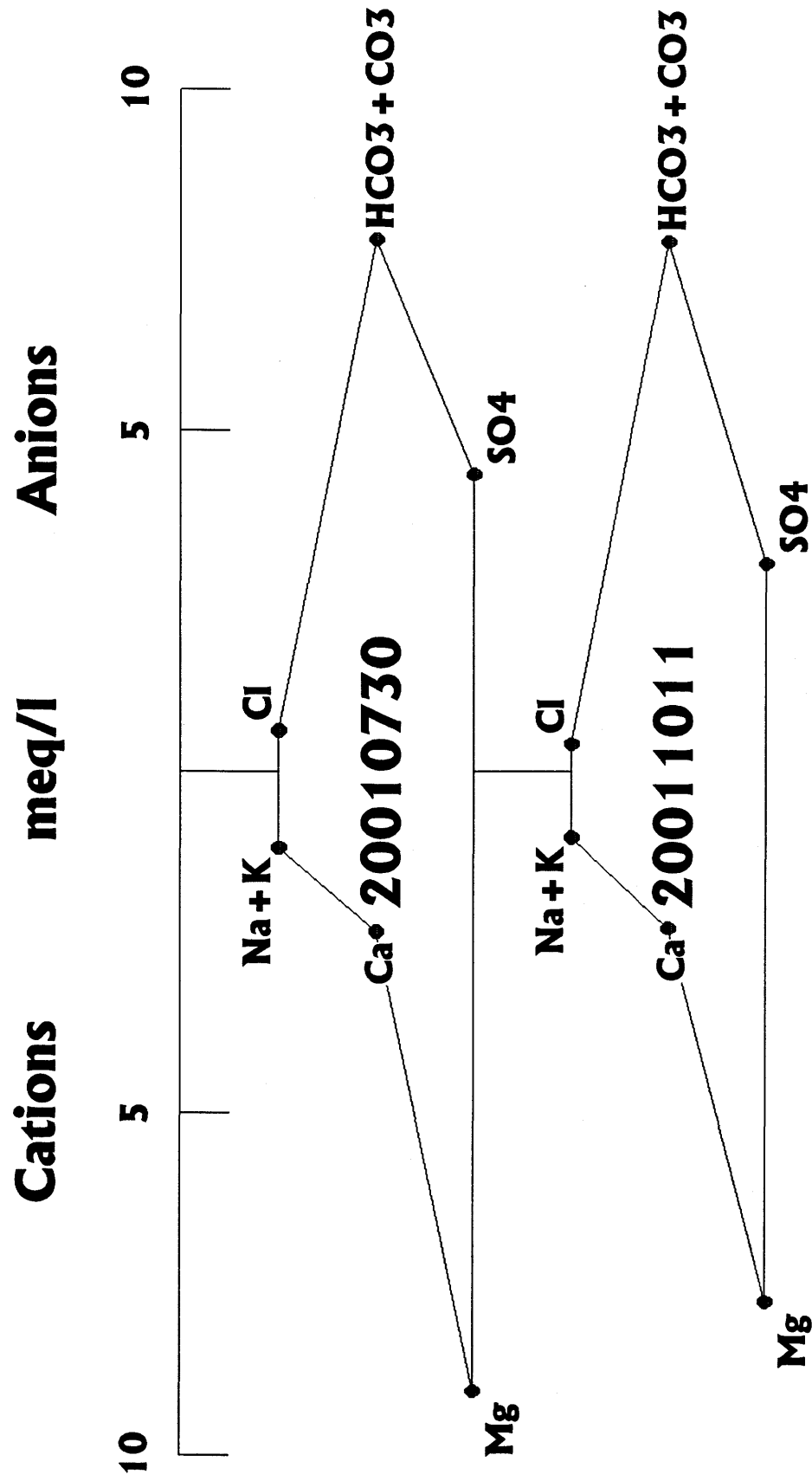
EMS 82-52



**EAST MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
BLACKHAWK FORMATION**

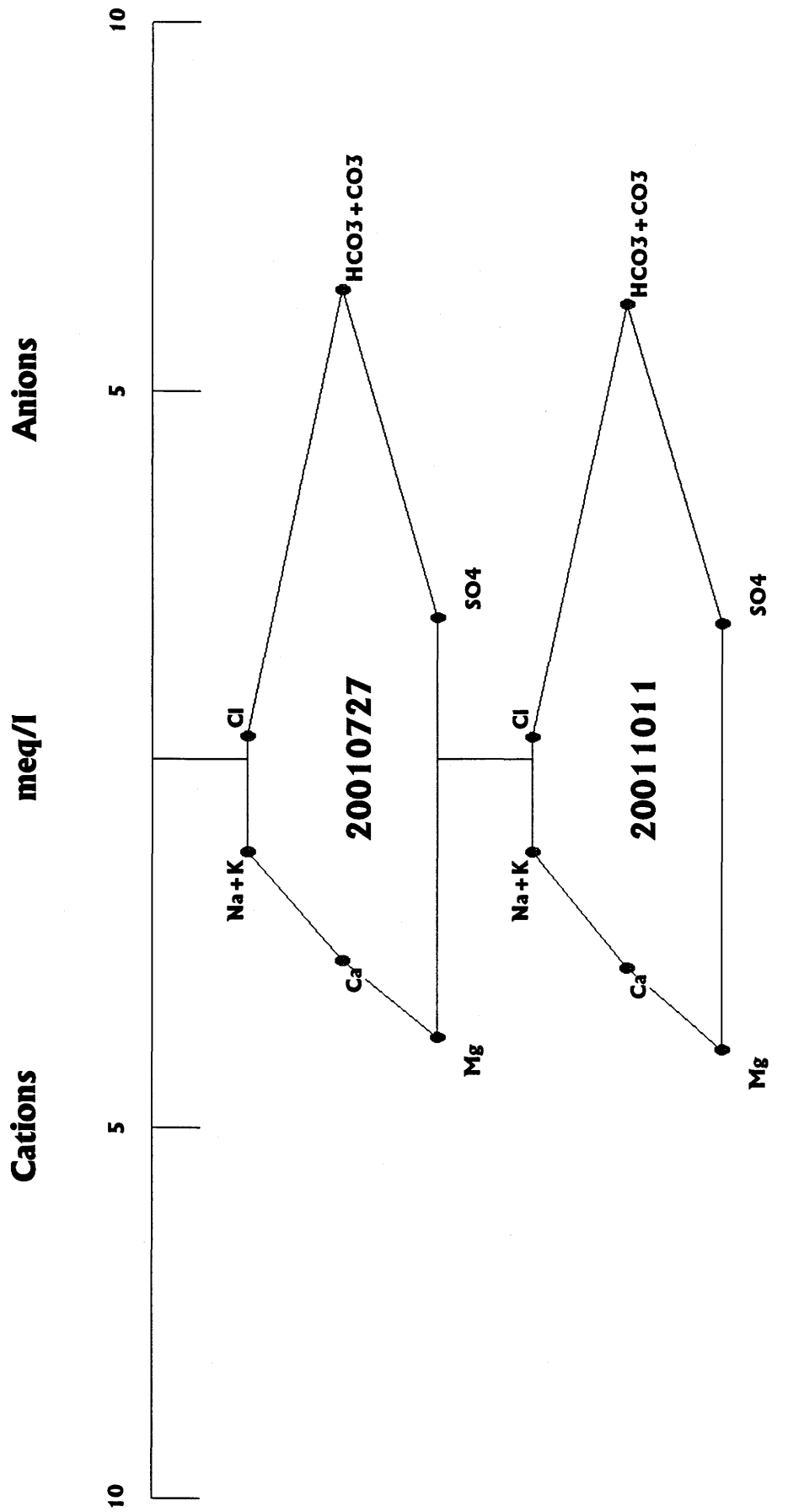
# EAST MOUNTAIN SPRINGS

EMS 80-50



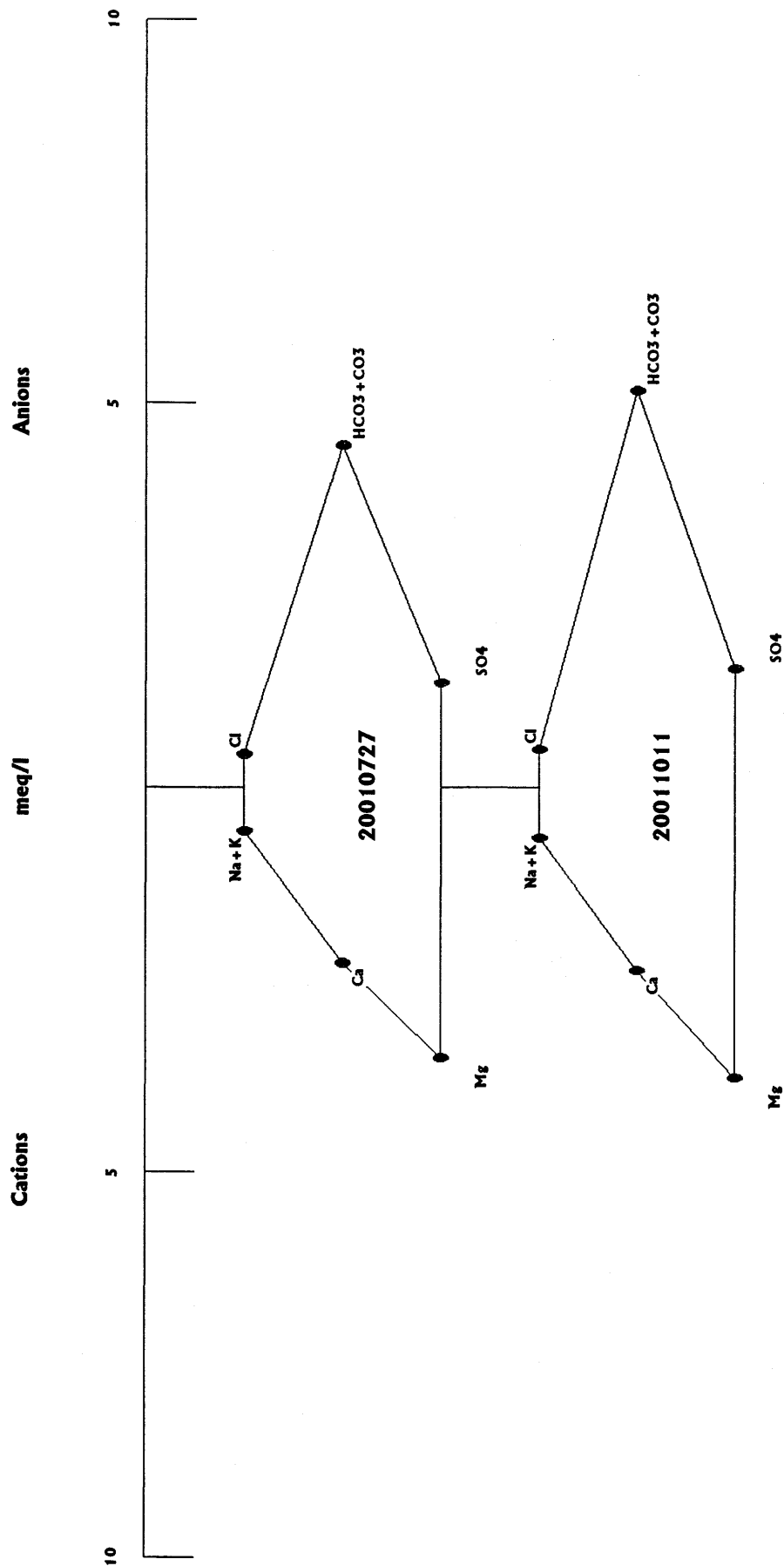
# EAST MOUNTAIN SPRINGS

EMS 91-72



# EAST MOUNTAIN SPRINGS

EMS 91-73

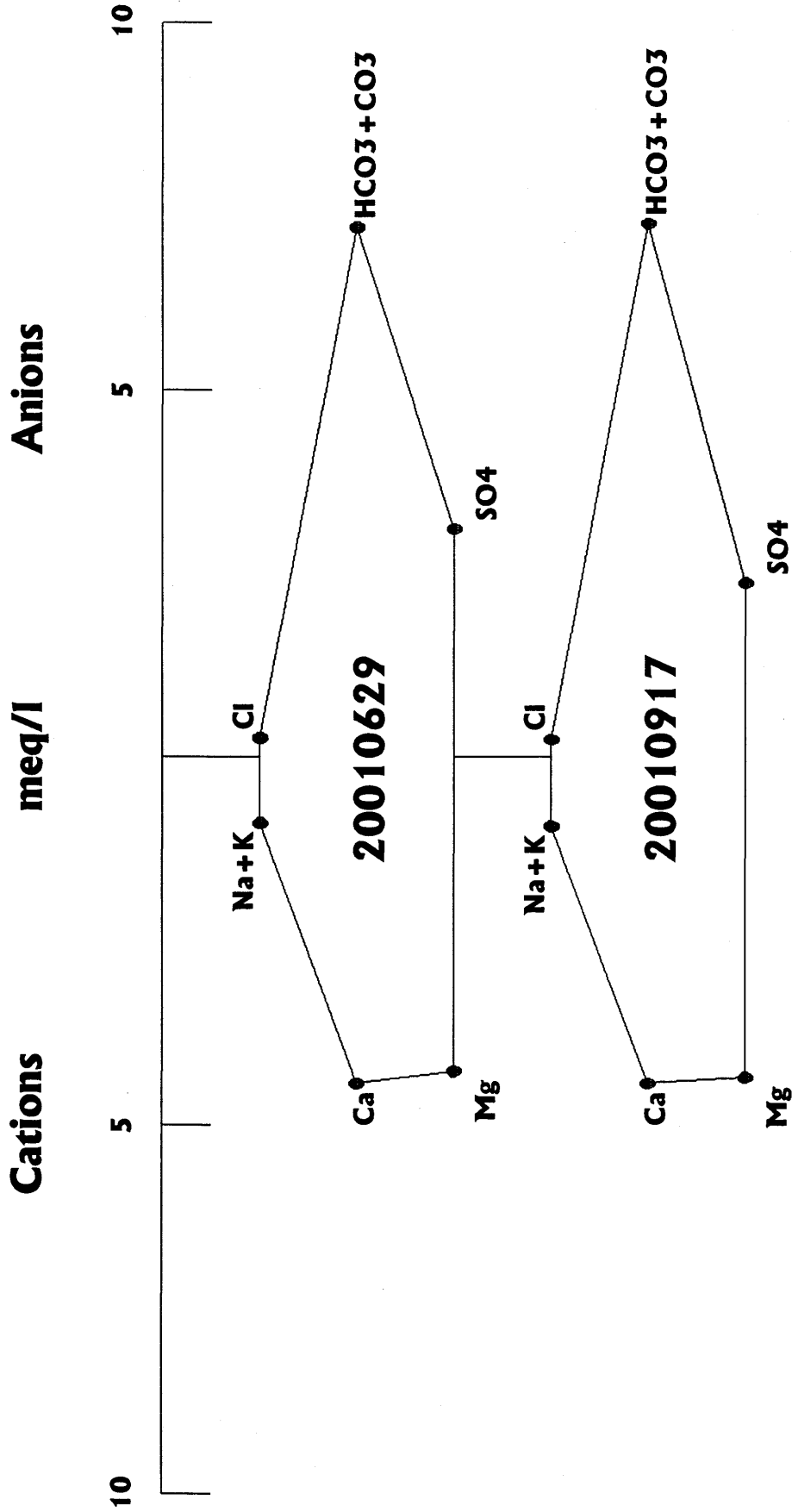


**EAST MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
RILDA CANYON ALLUVIUM**



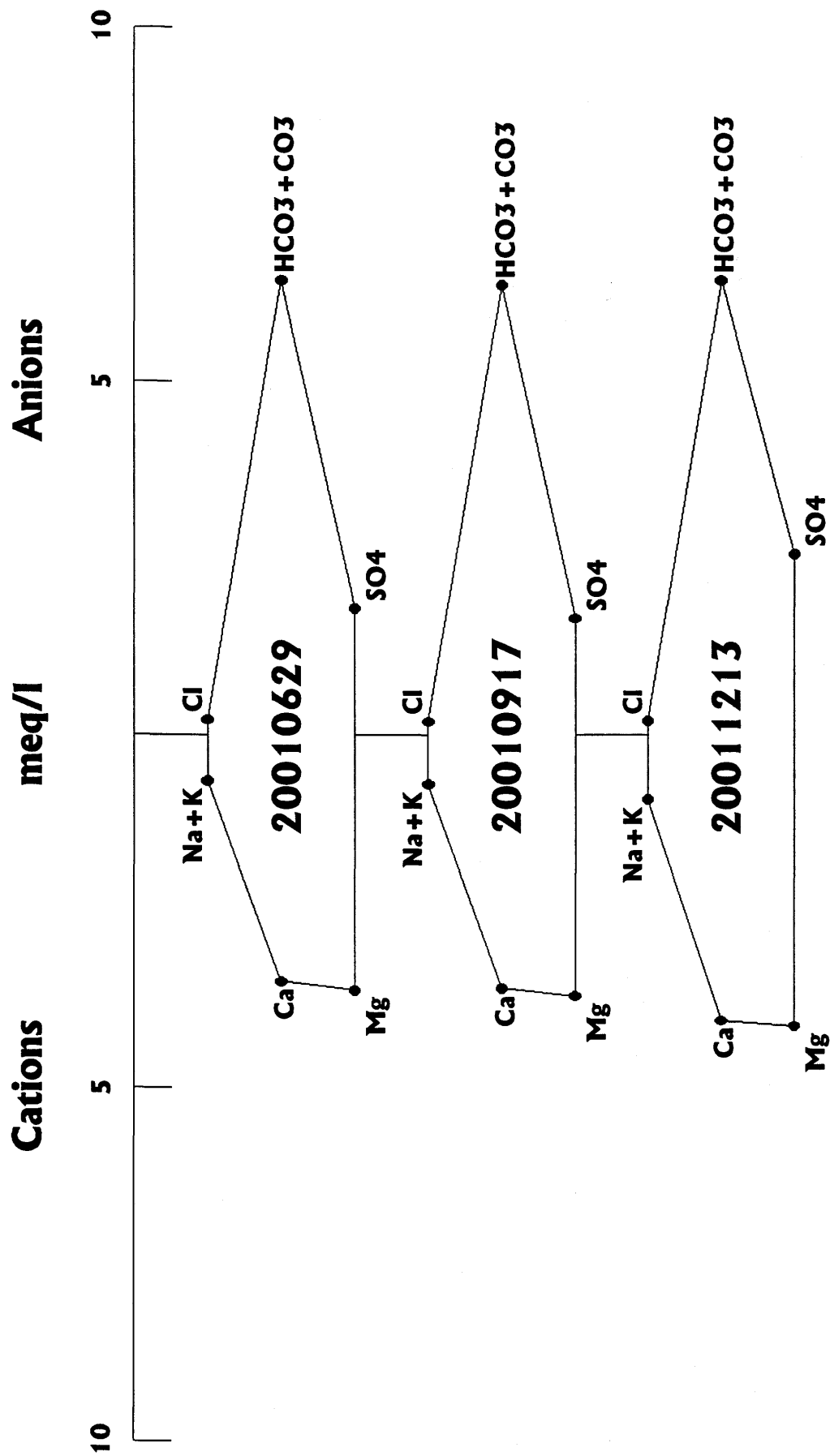
# EAST MOUNTAIN SPRINGS

## RILDA METER 2



# EAST MOUNTAIN SPRINGS

## RILDA METER 3



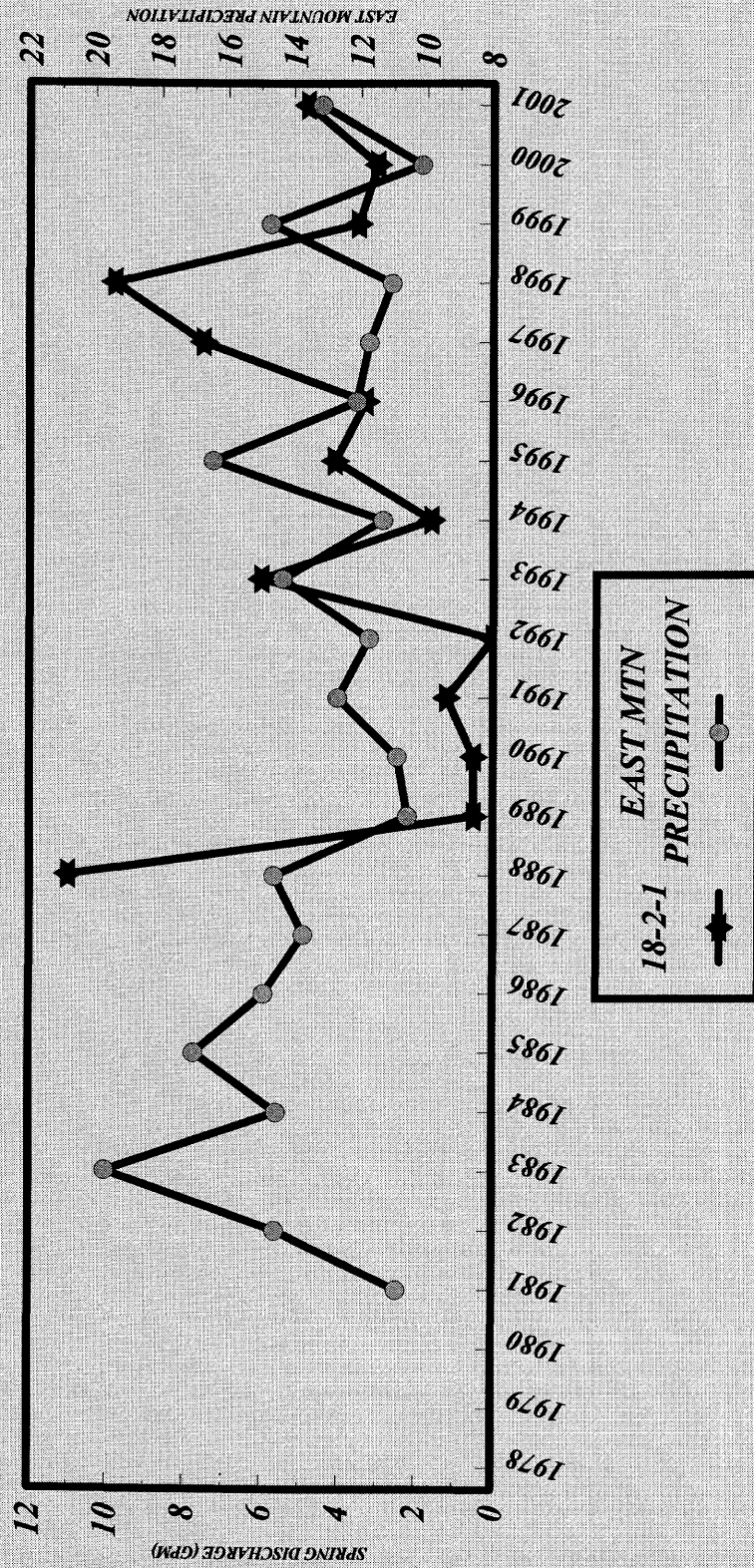
# **APPENDIX I**

## **2001**

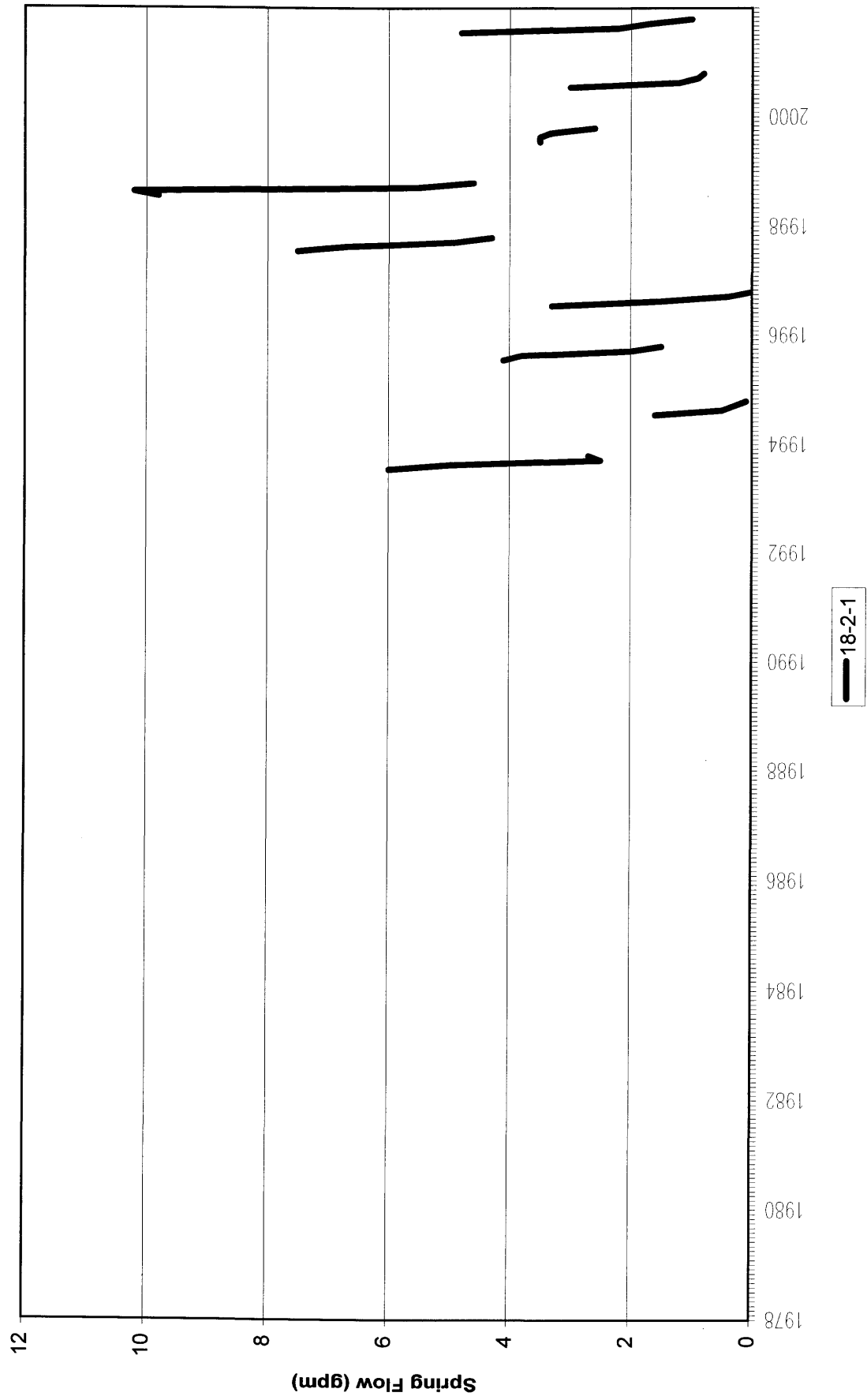
# TRAIL MOUNTAIN SPRINGS

## Spring 18-2-1 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



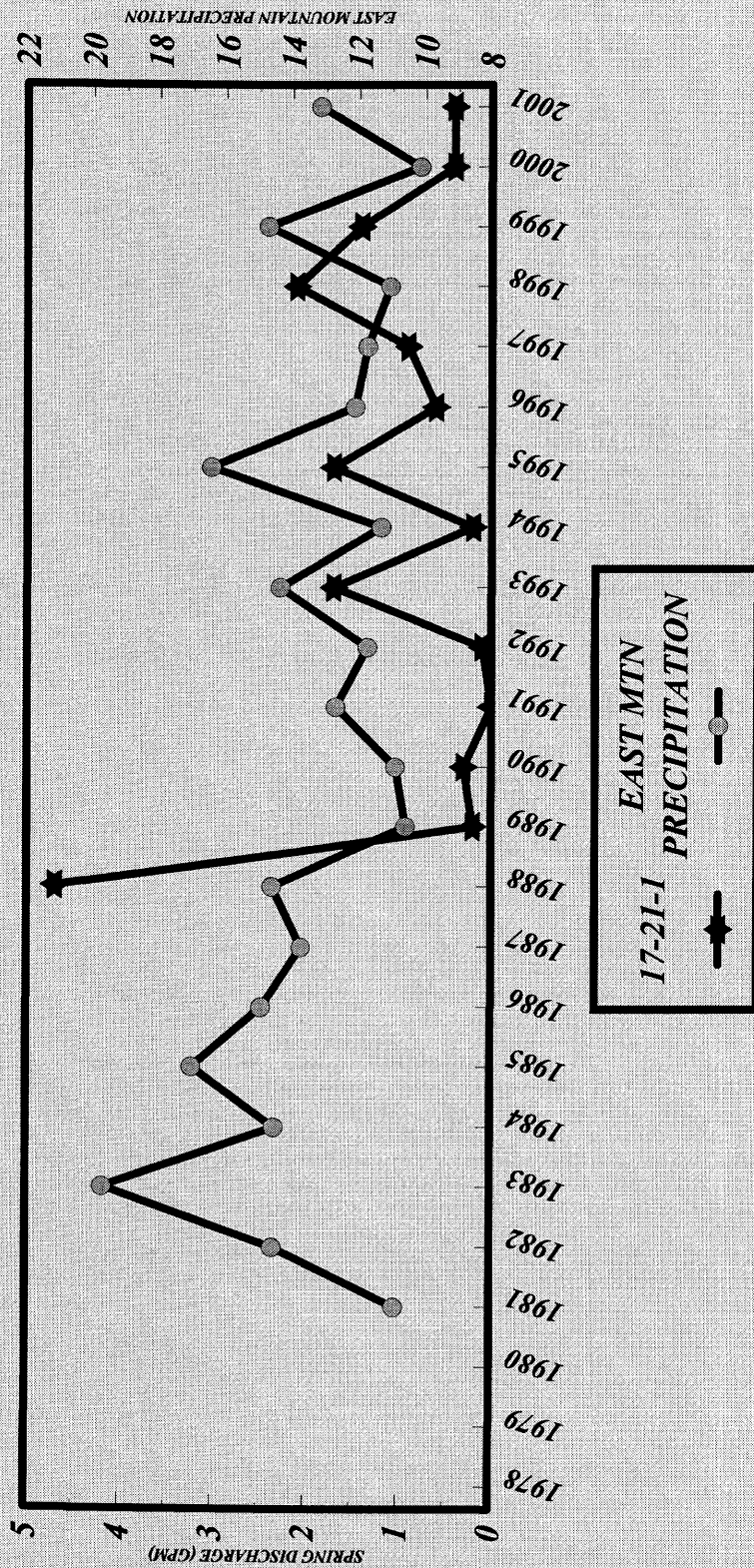
# Trail Mountain Springs: 18-2-1



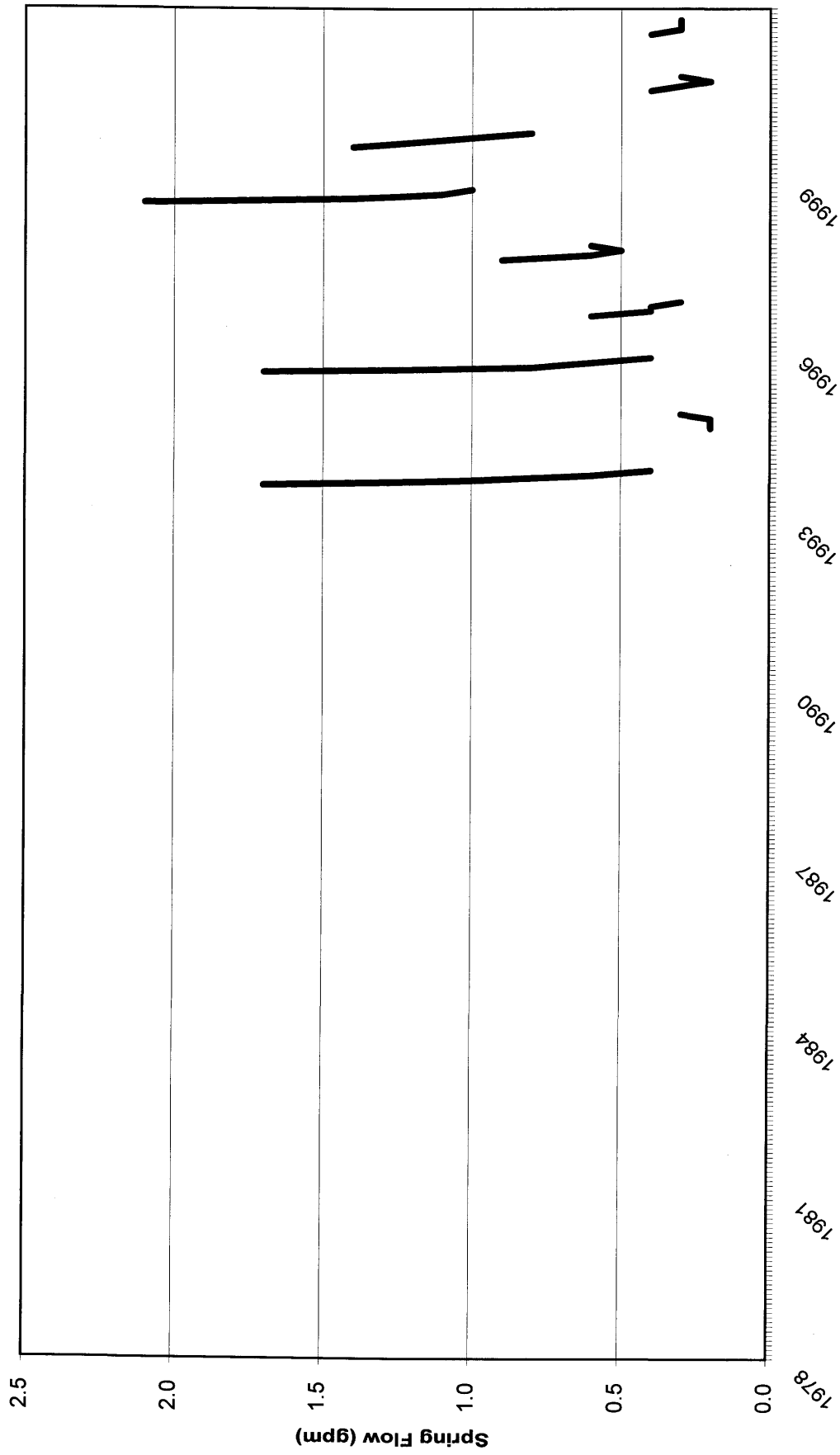
# TRAIL MOUNTAIN SPRINGS

## Spring 17-21-1 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



Trail Mountain Springs: 17-21-1



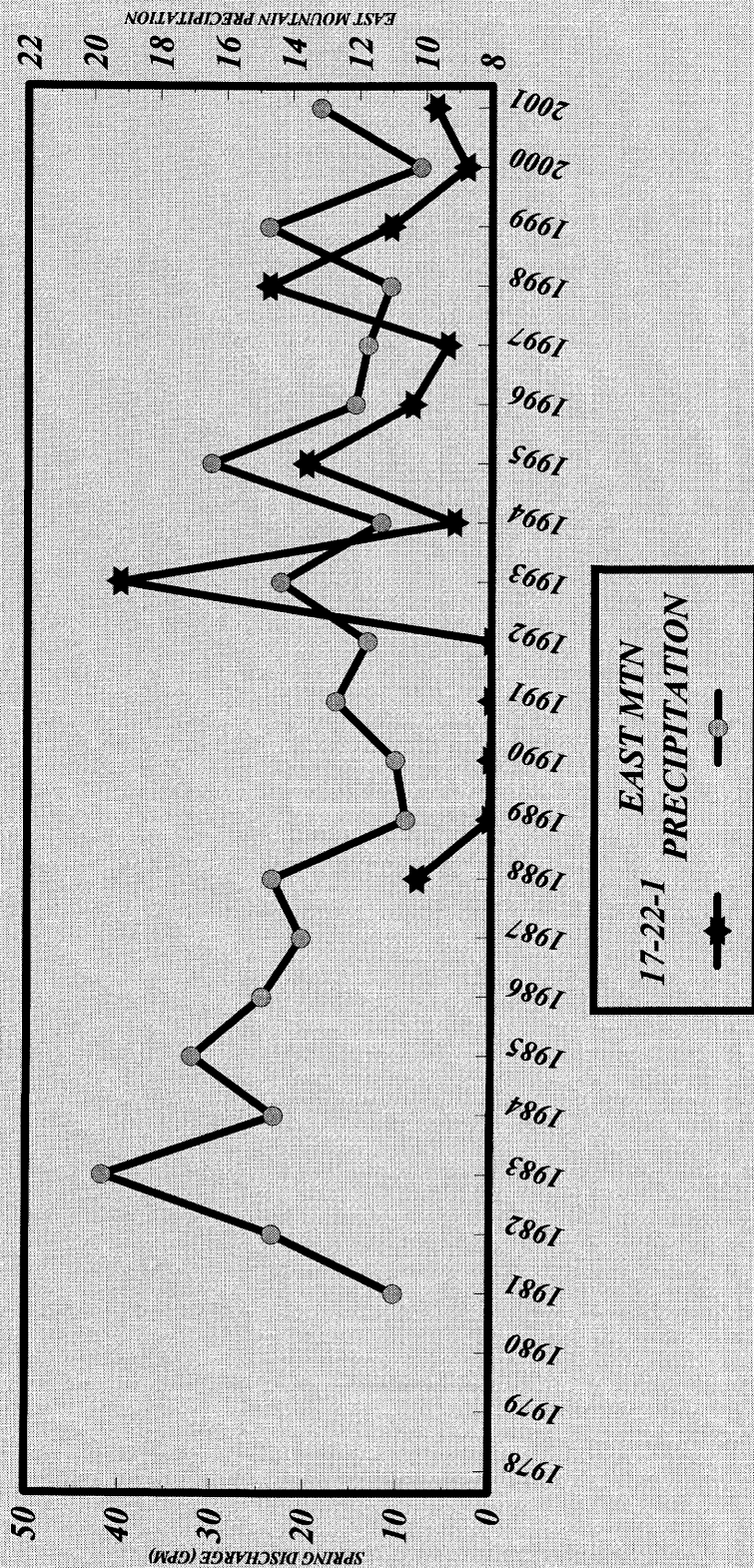
17-21-1



# TRAIL MOUNTAIN SPRINGS

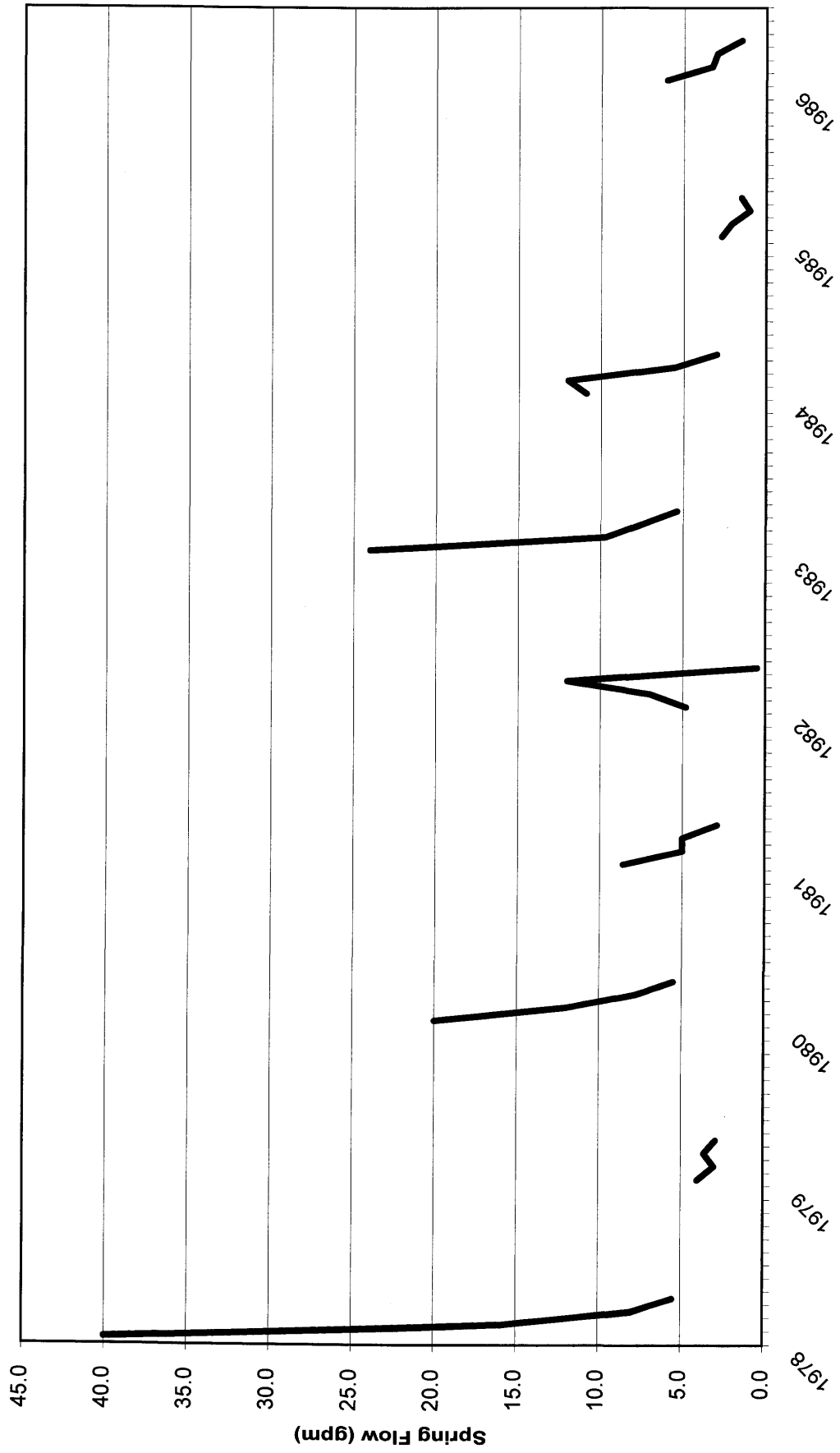
## Spring 17-22-1 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION





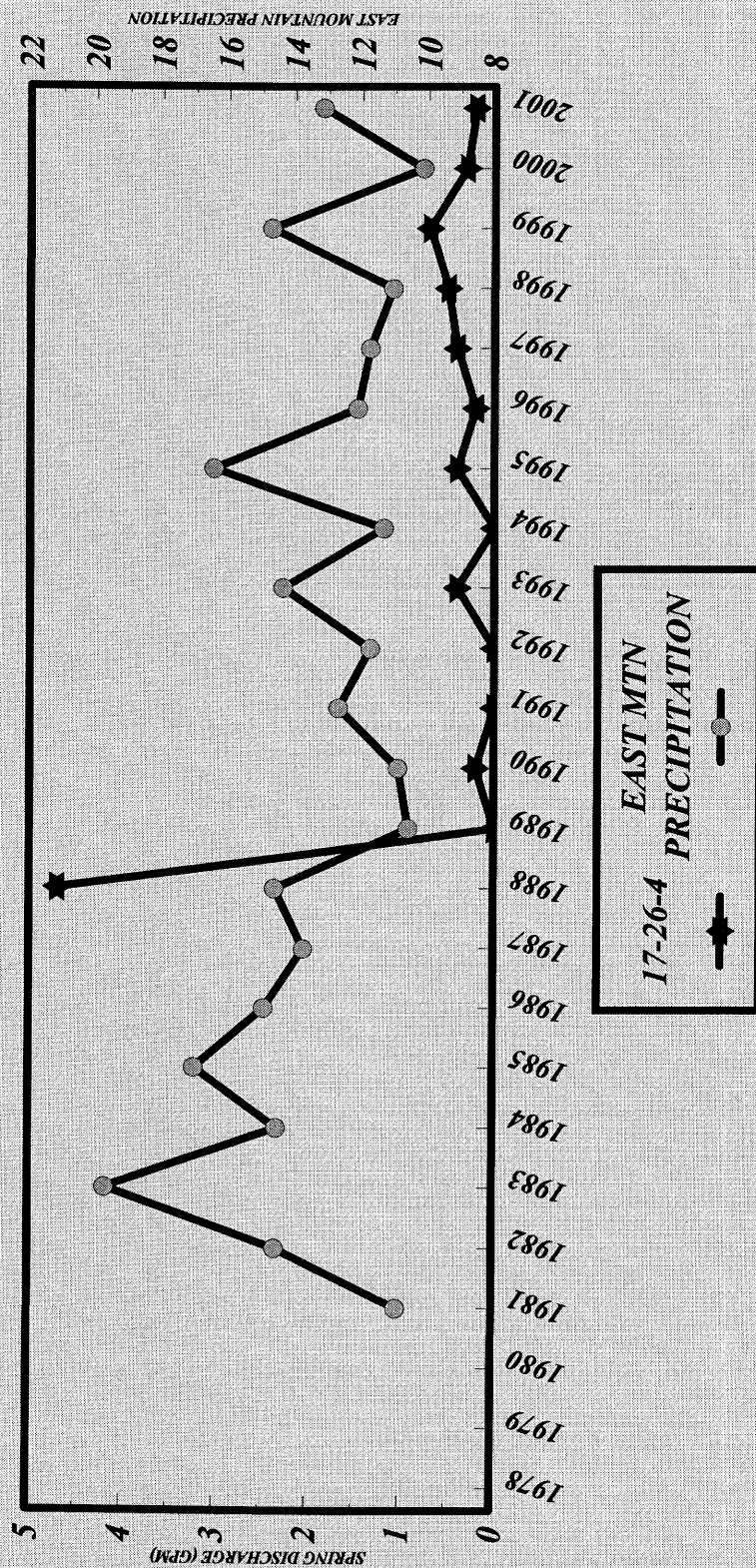
Trail Mountain Springs: 17-22-1



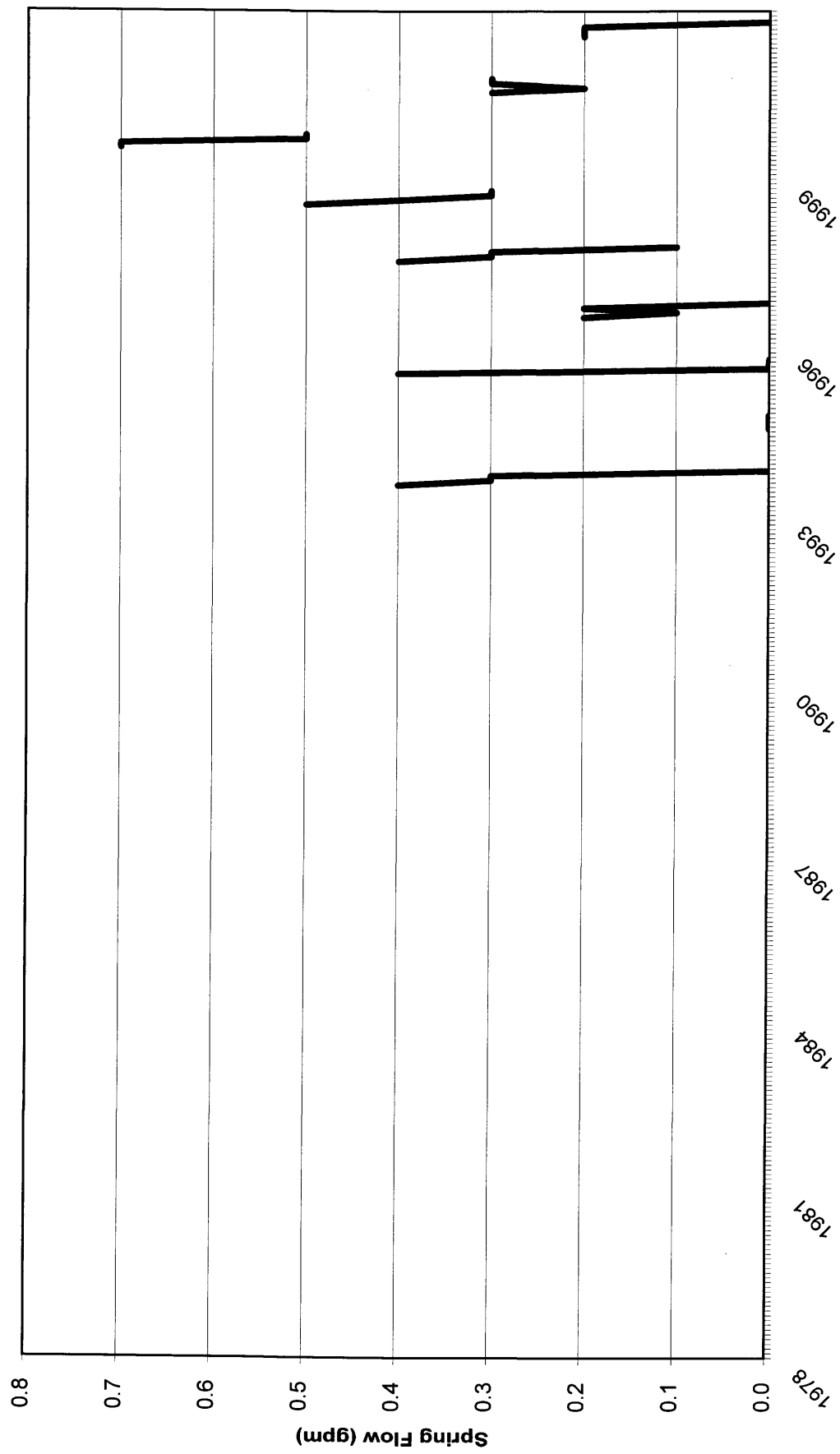
# TRAIL MOUNTAIN SPRINGS

## Spring 17-26-4 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



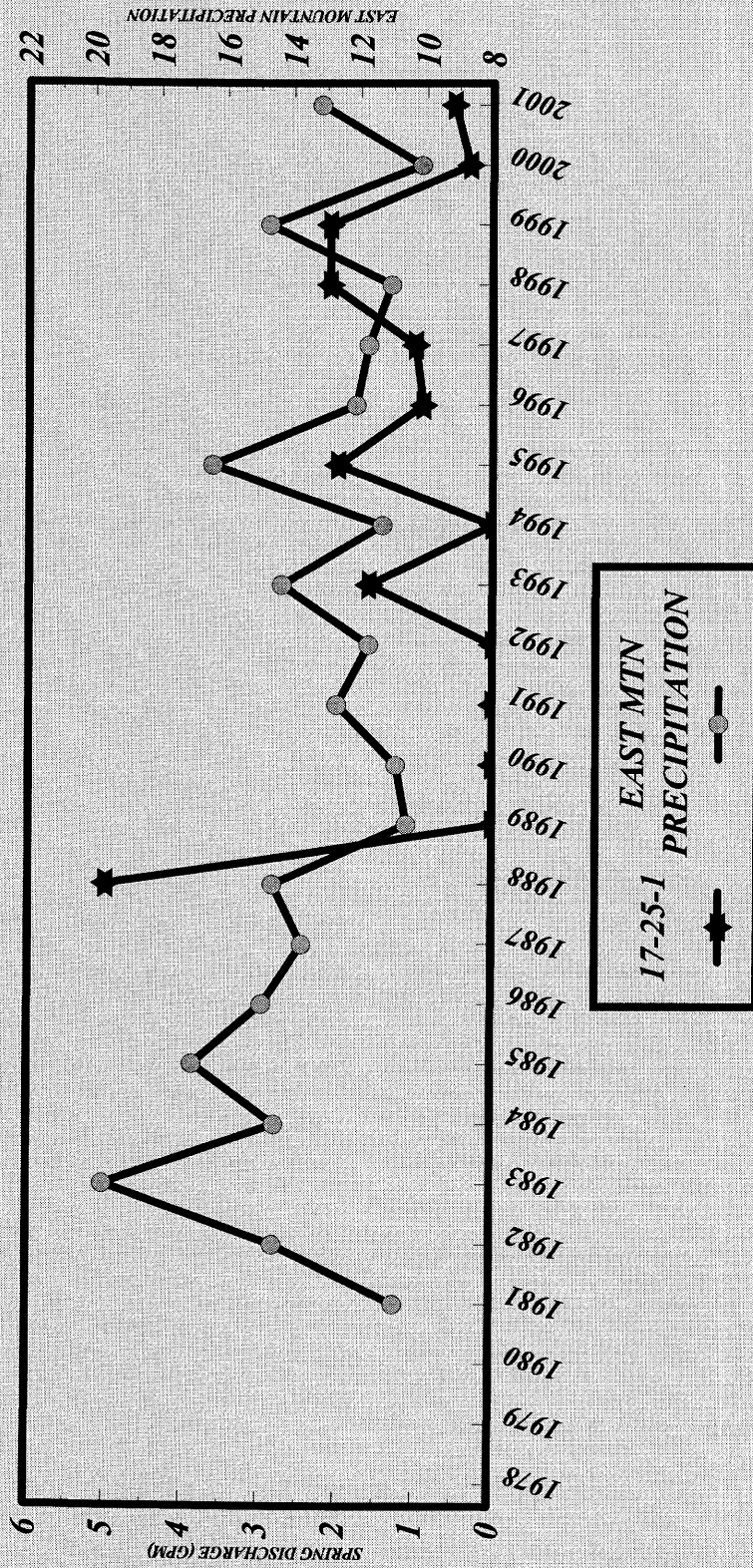
Trail Mountain Springs: 17-26-4



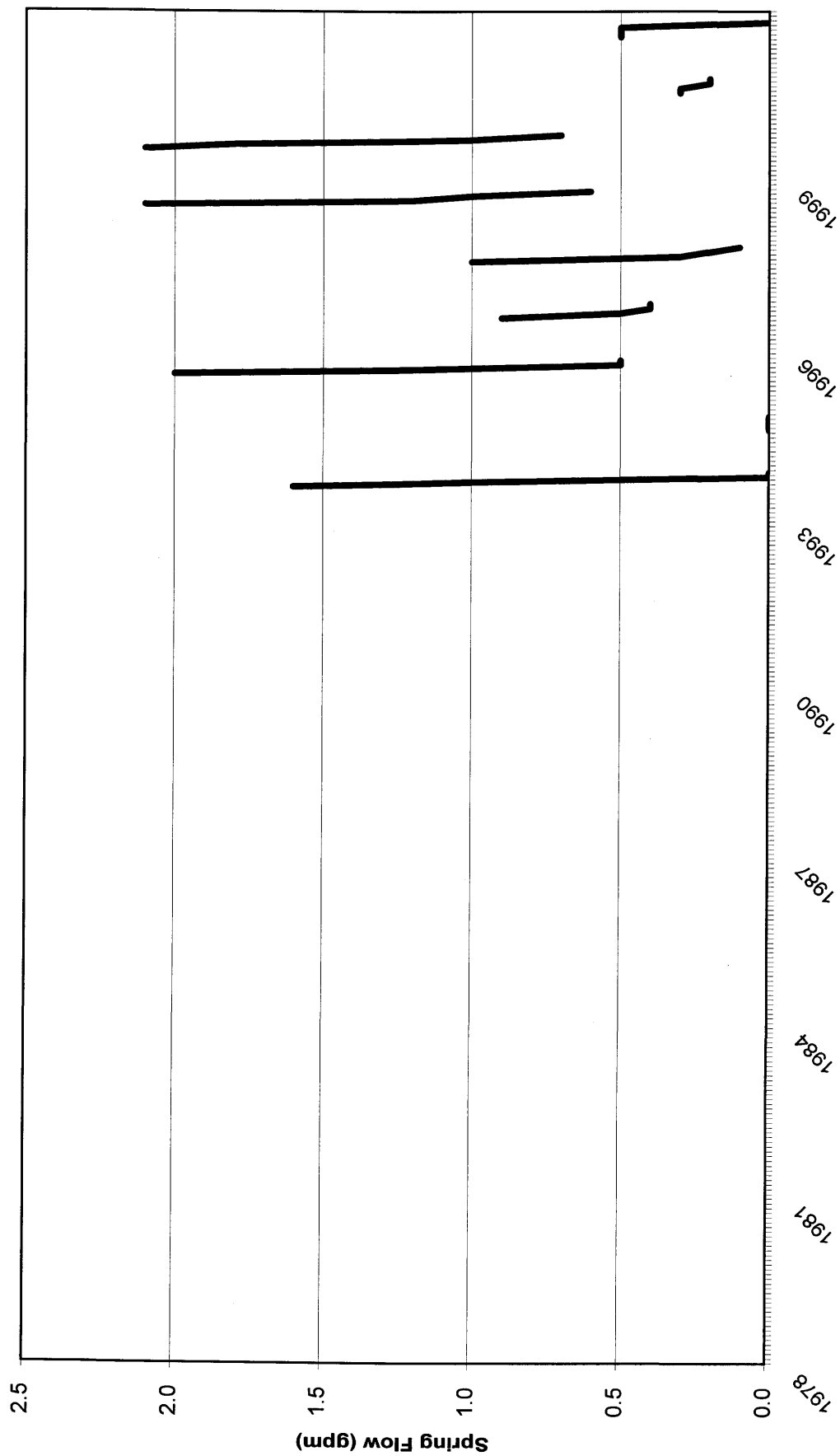
17-26-4

# *TRAIL MOUNTAIN SPRINGS* *Spring 17-25-1 vs. Precipitation*

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



Trail Mountain Springs: 17-25-1

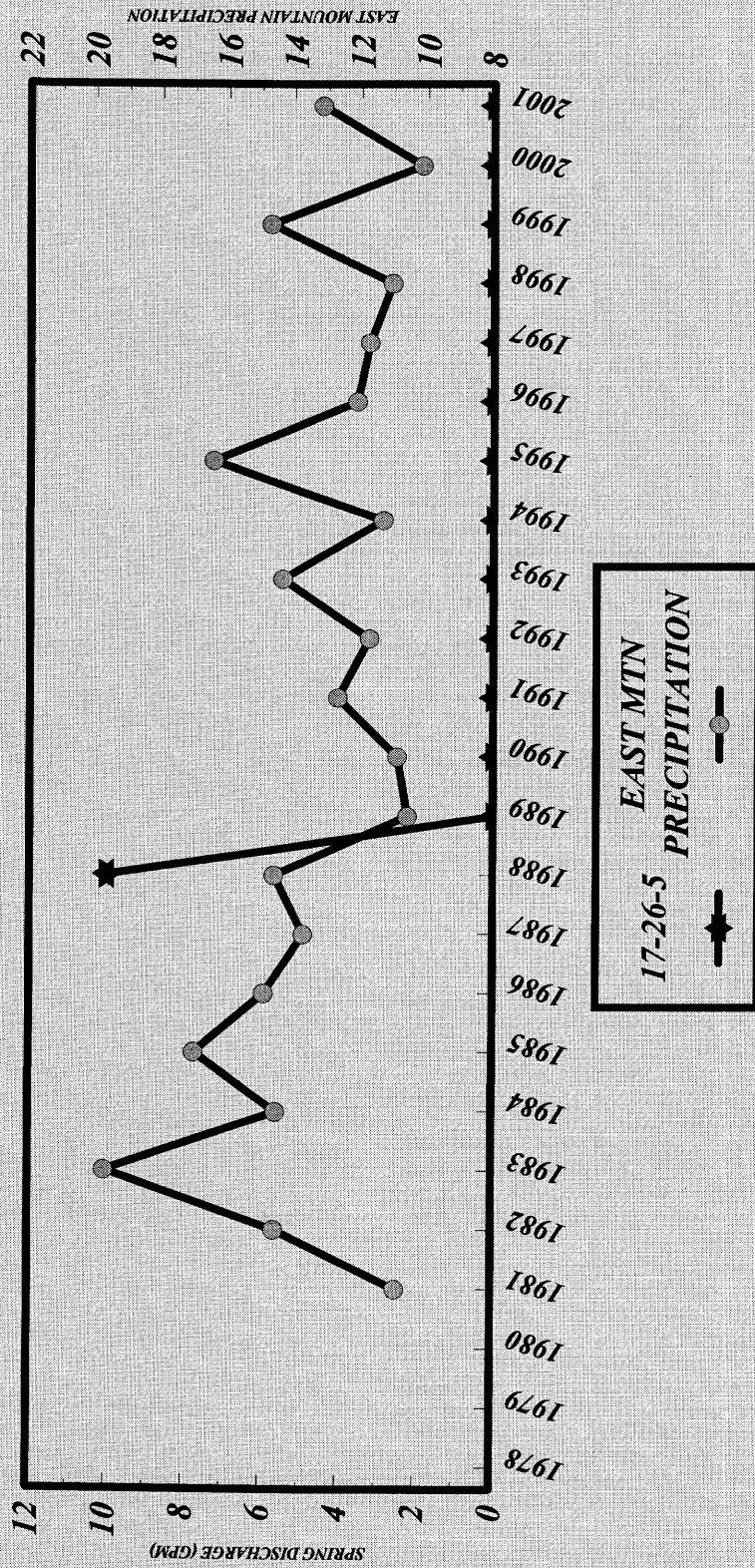




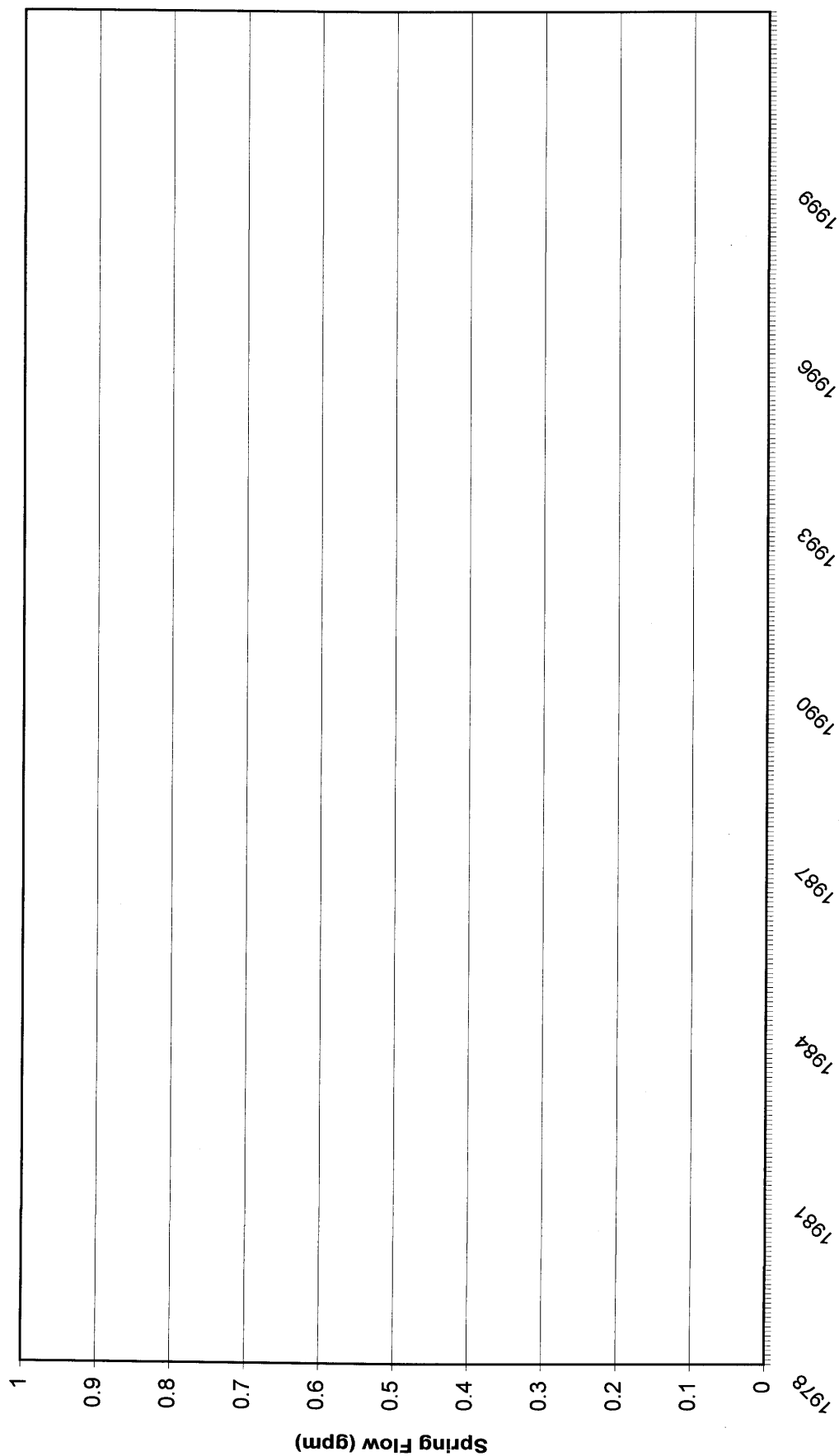
# TRAIL MOUNTAIN SPRINGS

## Spring 17-26-5 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



Trail Mountain Springs: 17-26-5

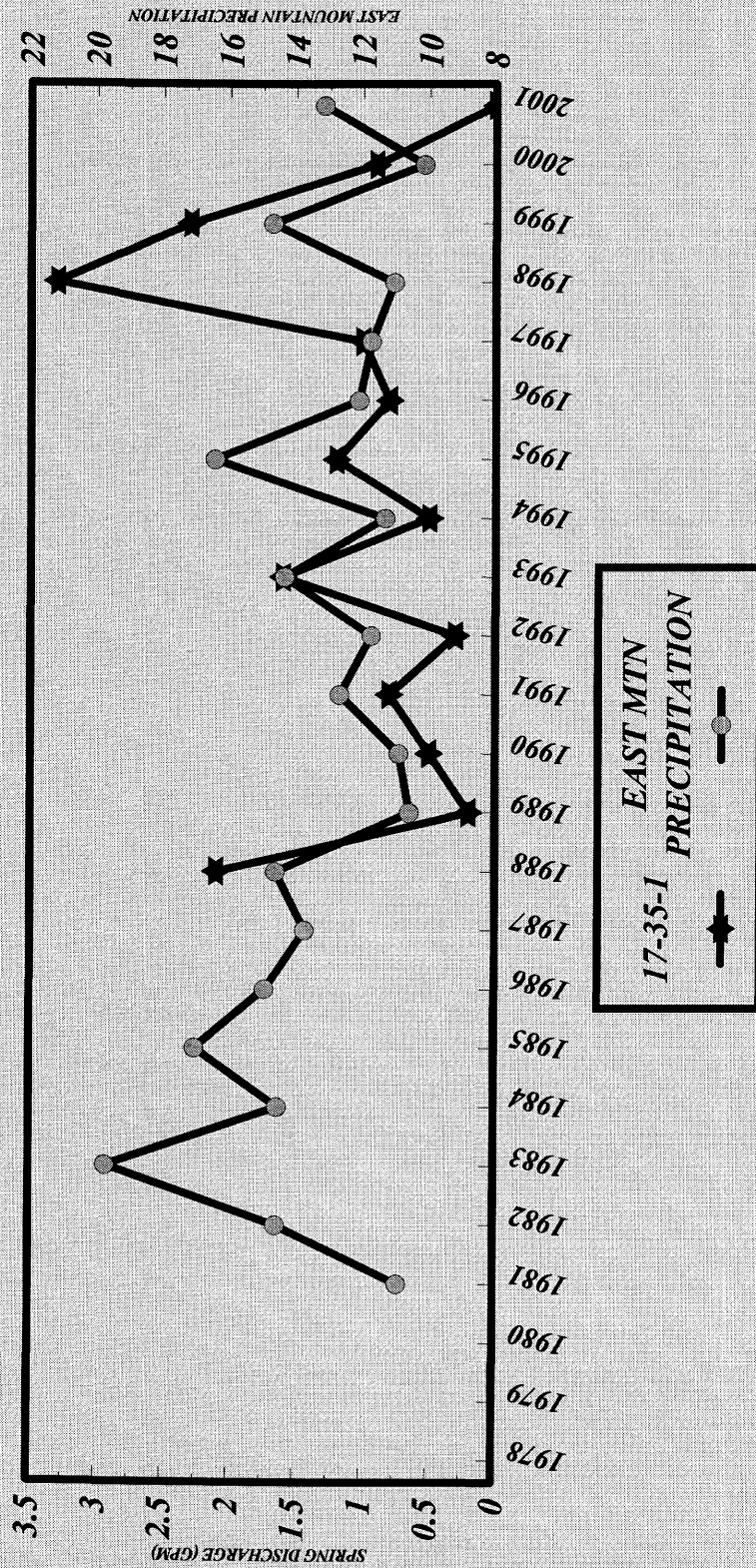


— 17-26-5

# TRAIL MOUNTAIN SPRINGS

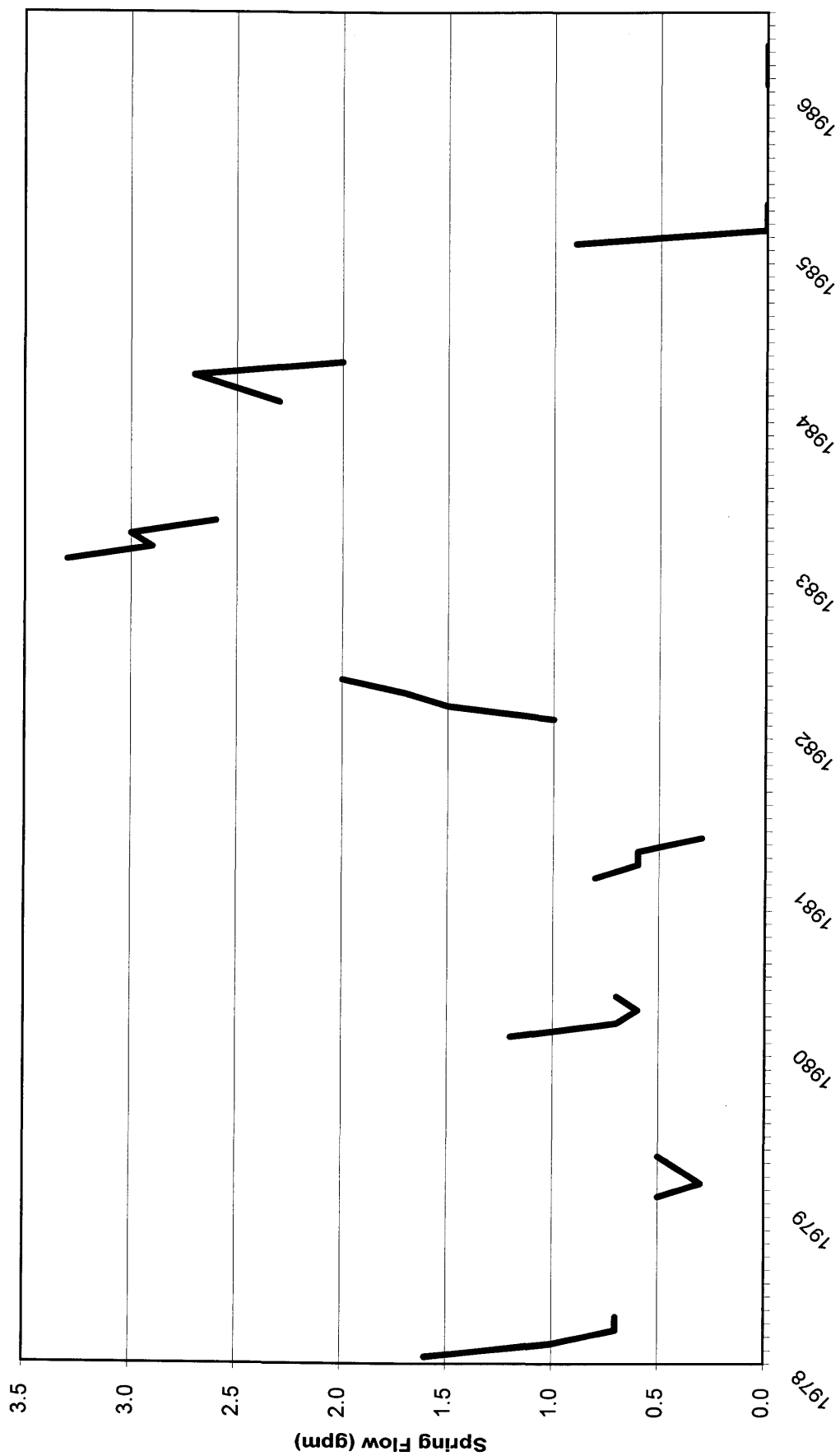
## Spring 17-35-1 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION





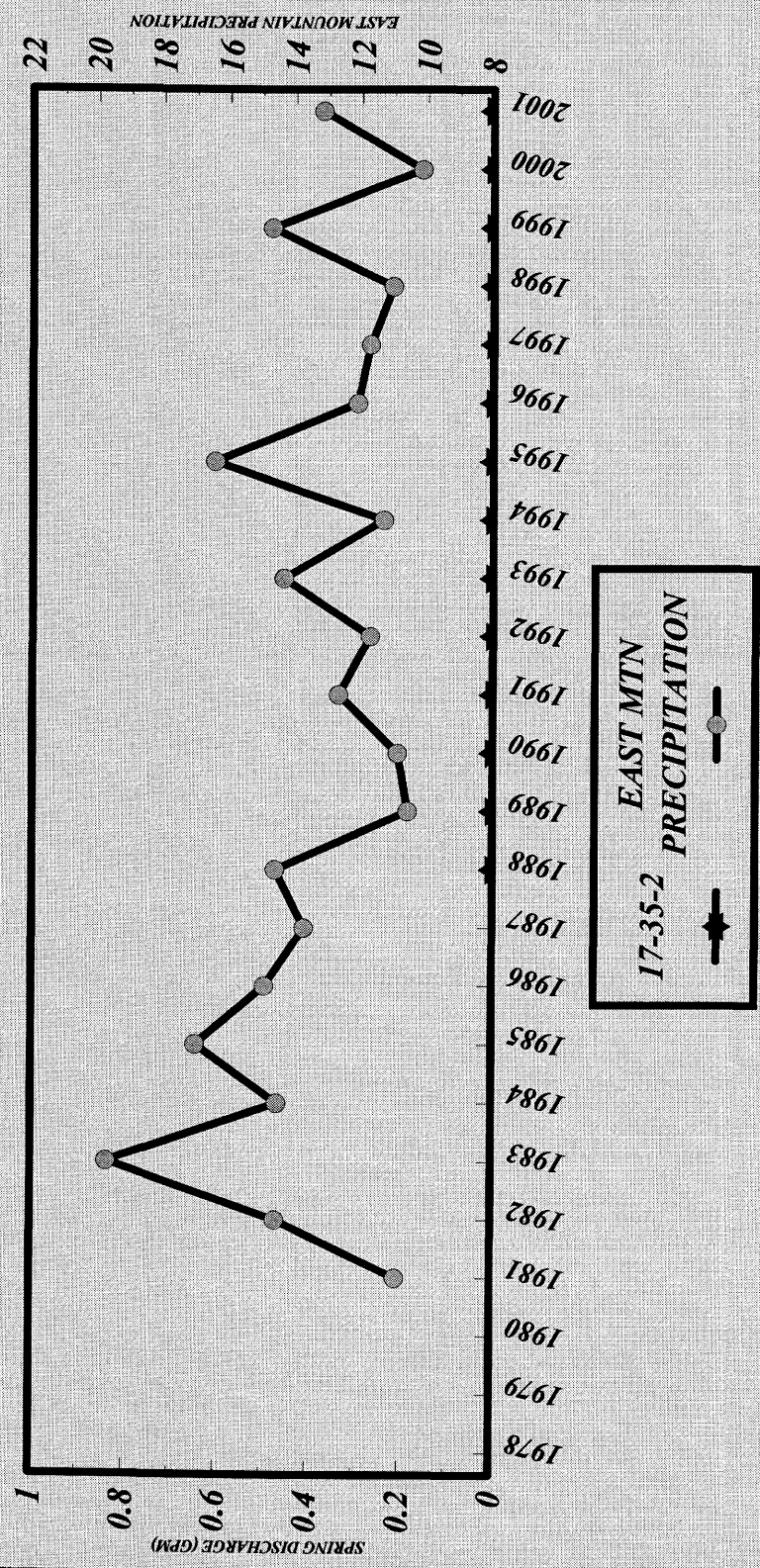
Trail Mountain Springs: 17-35-1



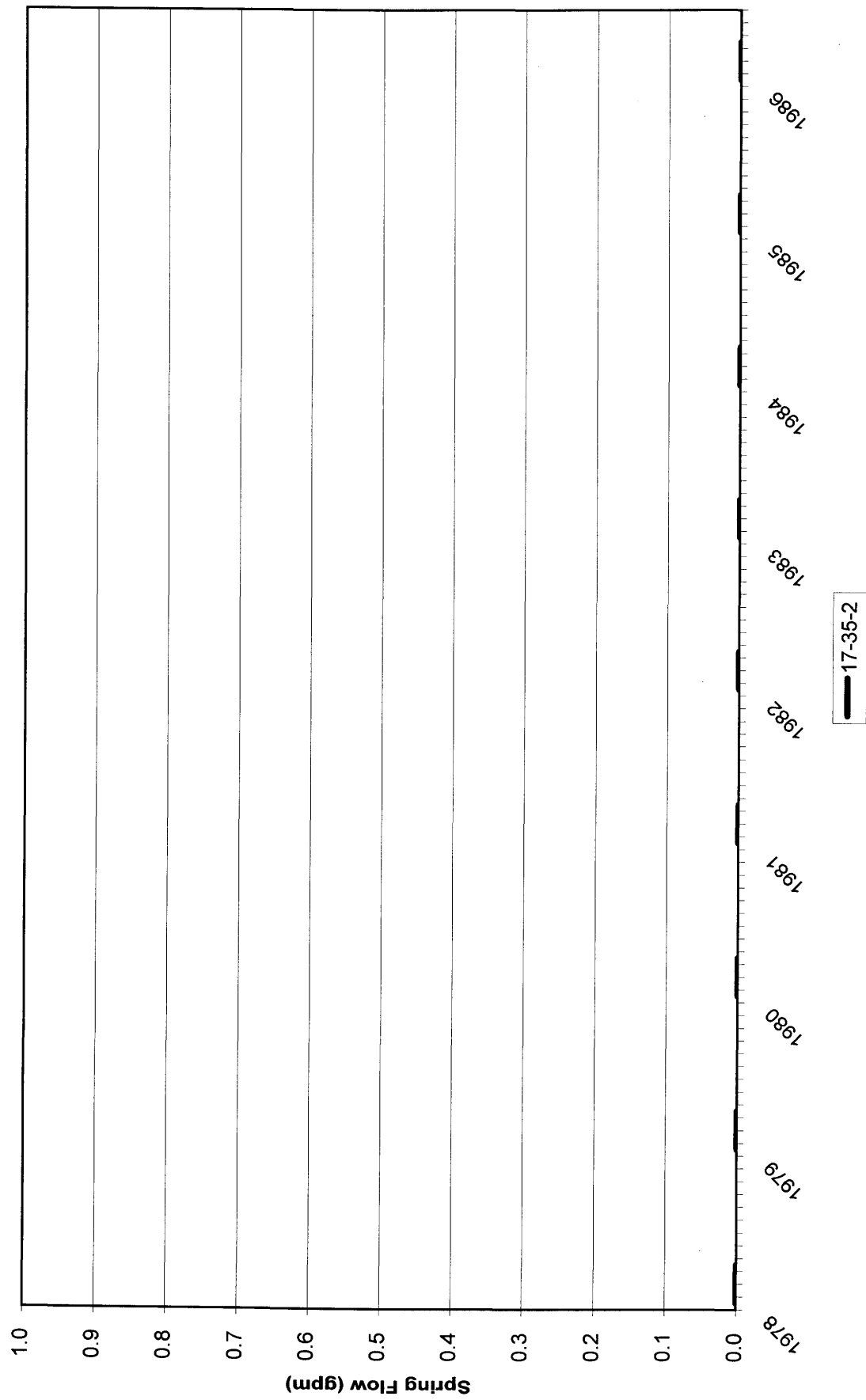
# TRAIL MOUNTAIN SPRINGS

## Spring 17-35-2 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



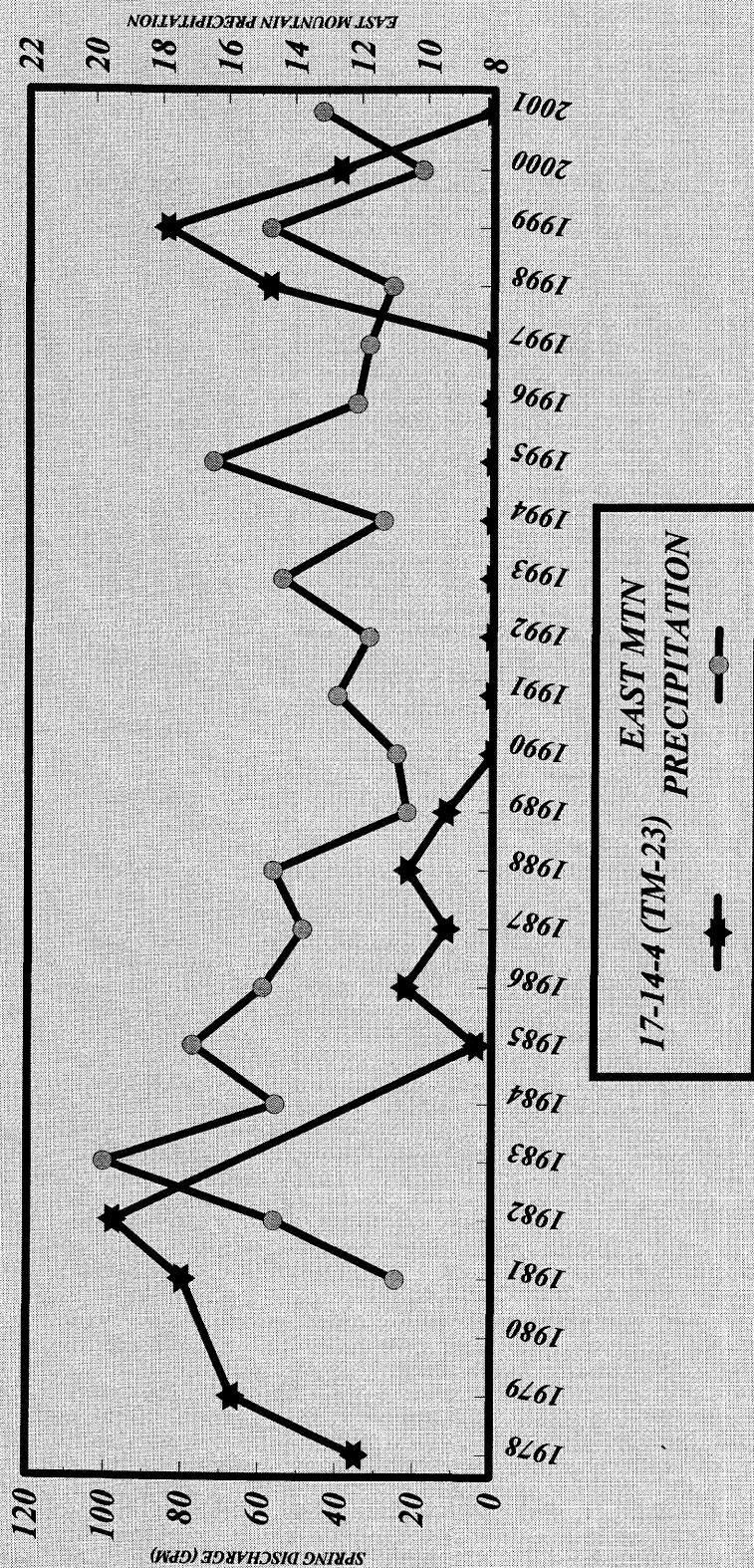
# Trail Mountain Springs: 17-35-2



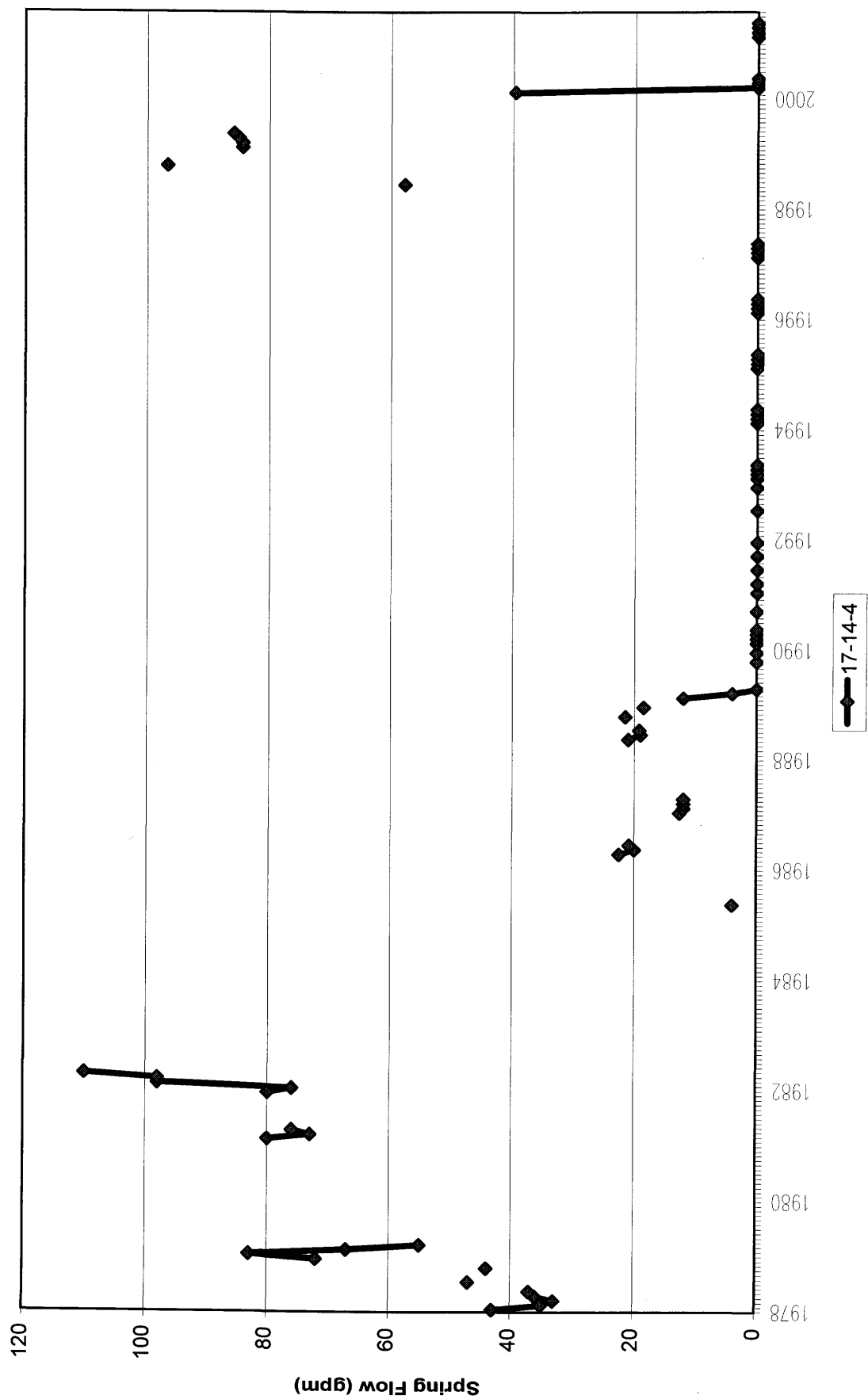
# TRAIL MOUNTAIN SPRINGS

## Spring 17-14-4 vs. Precipitation

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



Trail Mountain Springs: 17-14-4



Date	Flow (GPM)	Source	Flow (GPM)	Source	Flow (GPM)	Source
06/08/1978	43.0	USGS				
06/28/1978	41.0	USGS				
07/10/1978	35.0	USGS				
07/27/1978	33.0	USGS				
08/09/1978	33.0	USGS				
09/06/1978	36.0	USGS				
10/09/1978	37.0	USGS				
10/13/1978	38.0	USGS				
10/22/1978	41.0	USGS				
12/22/1978	47.0	USGS				
03/06/1979	44.0	USGS				
05/31/1979	72.0	USGS				
06/12/1979	83.0	USGS				
07/08/1979	67.0	USGS				
07/19/1979	64.0	USGS				
08/28/1979	55.0	USGS				
07/14/1981	80.0	USGS				
07/30/1981	76.0	USGS				
08/20/1981	73.0	USGS				
09/24/1981	76.0	USGS				
05/20/1982	80.0	USGS				
06/23/1982	76.0	USGS				
07/17/1982	98.0	USGS				
08/10/1982	98.0	USGS				
09/08/1982	110.0	USGS				
10/28/1985			4.0	JBR		
09/30/1986					22.5	TMCC
10/20/1986					20.0	TMCC
11/11/1986					20.8	TMCC
06/30/1987					12.6	TMCC
07/15/1987					12.0	TMCC
08/31/1987						
09/25/1987						BCCC
06/30/1988						BCCC
09/20/1988						BCCC
10/31/1988						BCCC
11/29/1988						BCCC
12/07/1988						BCCC
03/13/1989						BCCC
05/25/1989						BCCC
07/19/1989						BCCC
08/25/1989						BCCC
09/17/1989						BCCC
03/01/1990						BCCC
05/28/1990						BCCC
07/24/1990						BCCC
08/23/1990						BCCC
09/28/1990						BCCC
10/26/1990						BCCC
02/28/1991						BCCC

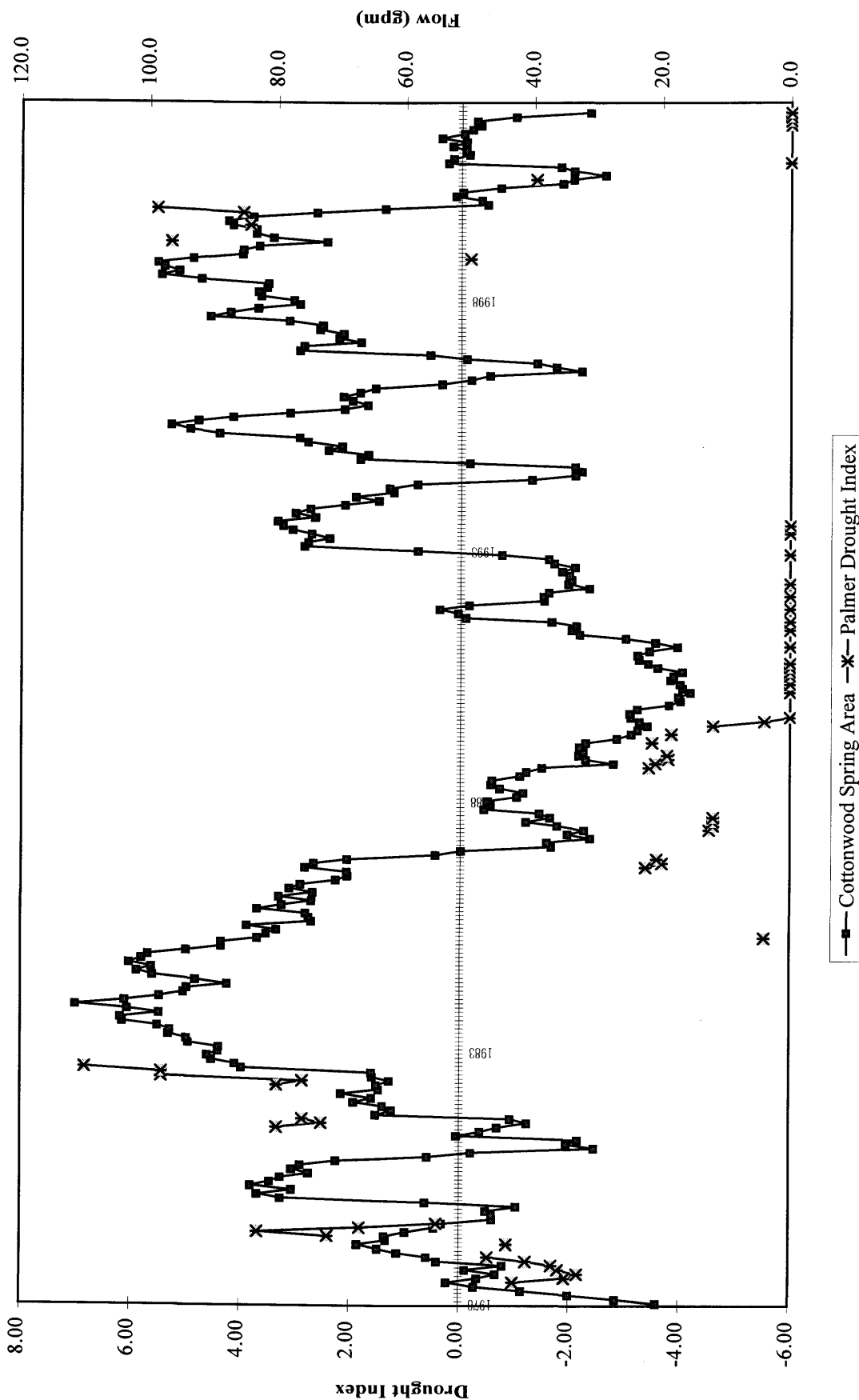
# Cottnwood Spring Flow Data

Date	Flow (GPM)	Source	Flow (GPM)	Source	Flow (GPM)	Source	Flow (GPM)	Source
06/17/1991								
08/23/1991								
11/25/1991								
02/25/1992								
05/13/1992								
12/15/1992								
05/19/1993								
07/21/1993								
07/01/1994								
07/01/1995								
07/01/1996								
07/01/1997								
11/02/1998								
03/26/1999								
07/13/1999								
08/30/1999								
10/06/1999								
11/10/1999								
06/05/2000								
10/18/2000								
07/19/2001								
08/27/2001								
09/06/2001								
10/10/2001								

\* Difficulty Sealing Weir @ Below Roans Site, measuerd @ 49.2 GPM

Sources:  
 1981- USGS  
 1982- USGS  
 1985- JBR  
 1986- TMCC  
 1988- BCCC  
 1989- BCCC  
 1990- BCCC  
 1991- BCCC  
 1992- BCCC  
 1993-2000 EW

Palmer Drought Index vs. Cottonwood Spring Area Flow  
(Palmer Data Average of Regions 4 & 5)



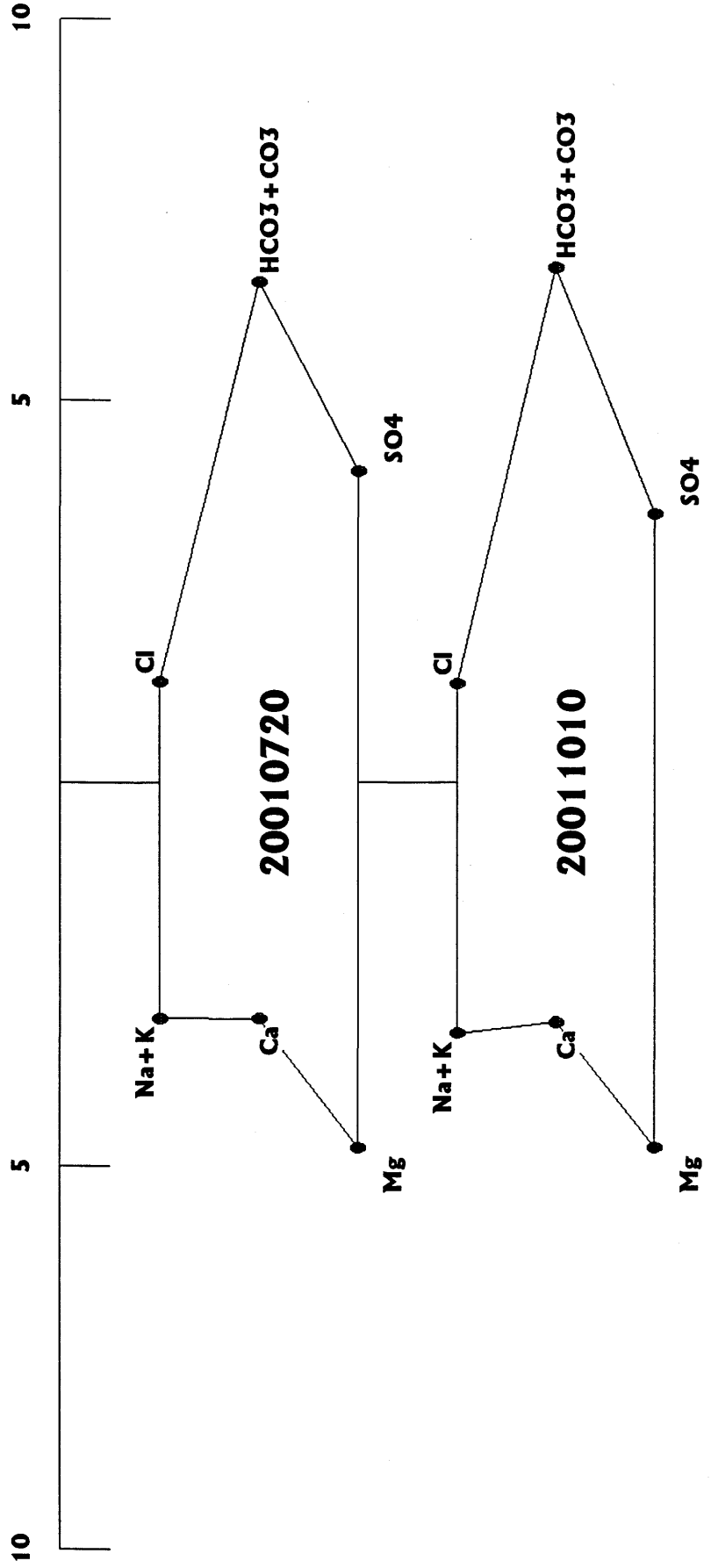


**TRAIL MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
NORTH HORN FORMATION**

# TRAIL MOUNTAIN SPRINGS

18-2-1

Cations                      meq/l                      Anions



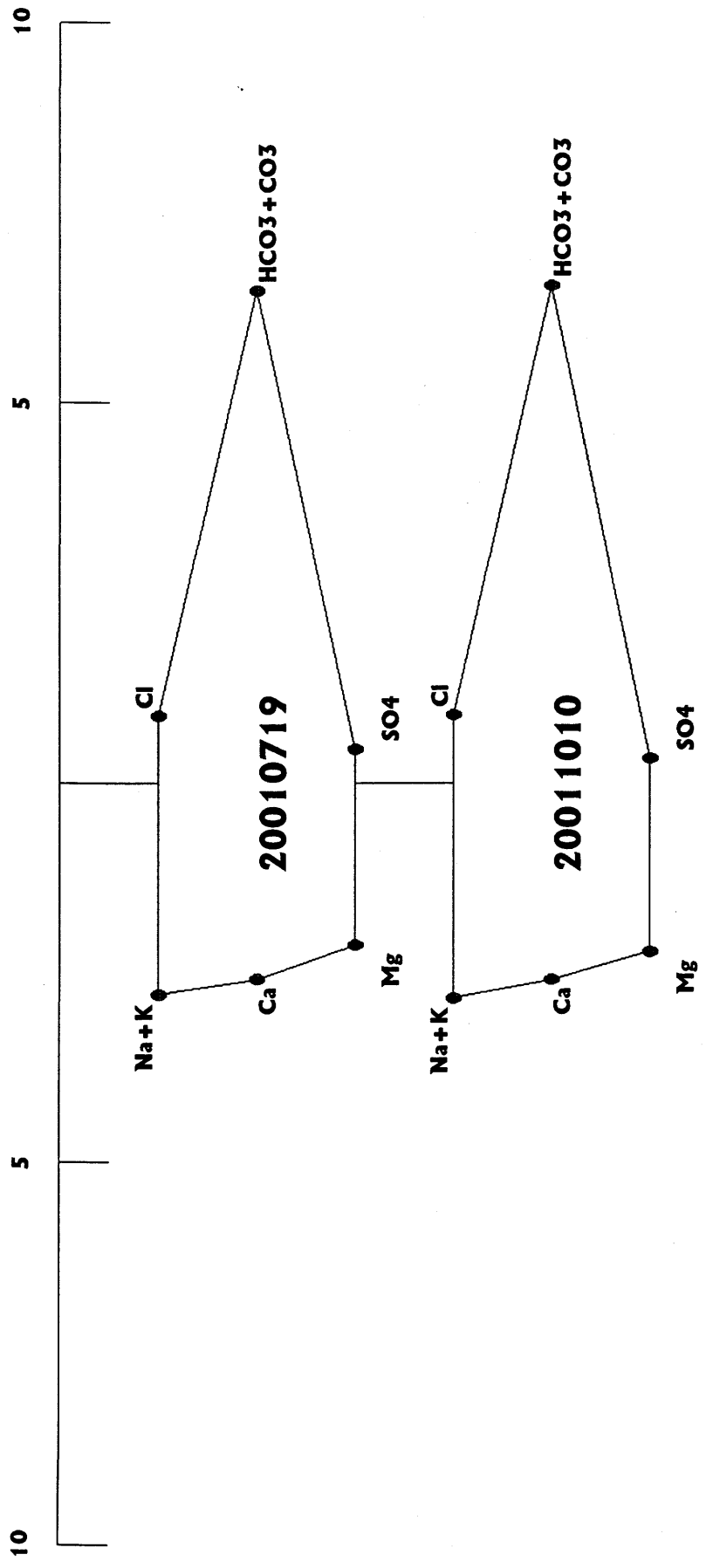
# TRAIL MOUNTAIN SPRINGS

17-21-1

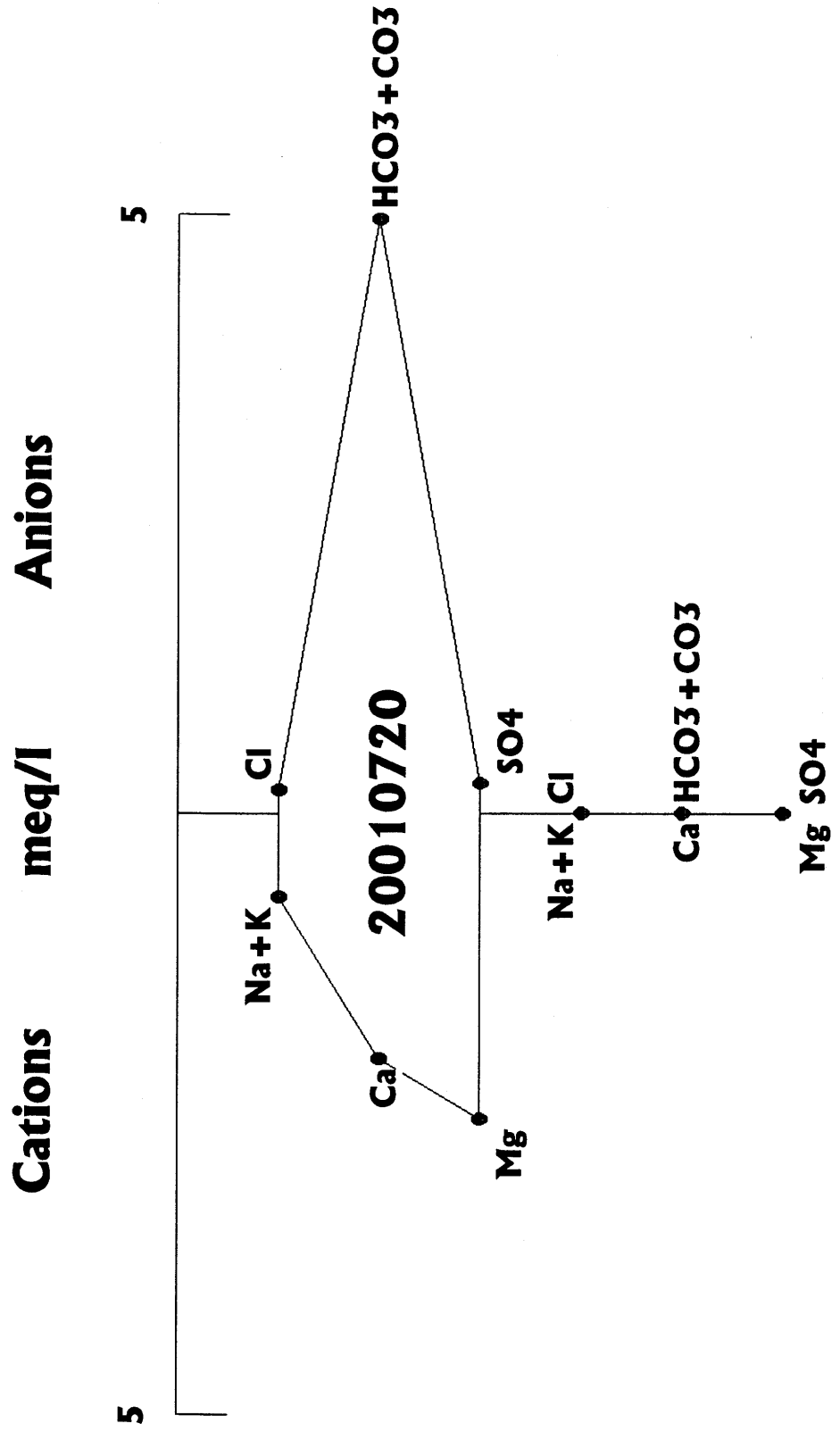
Cations

meq/l

Anions



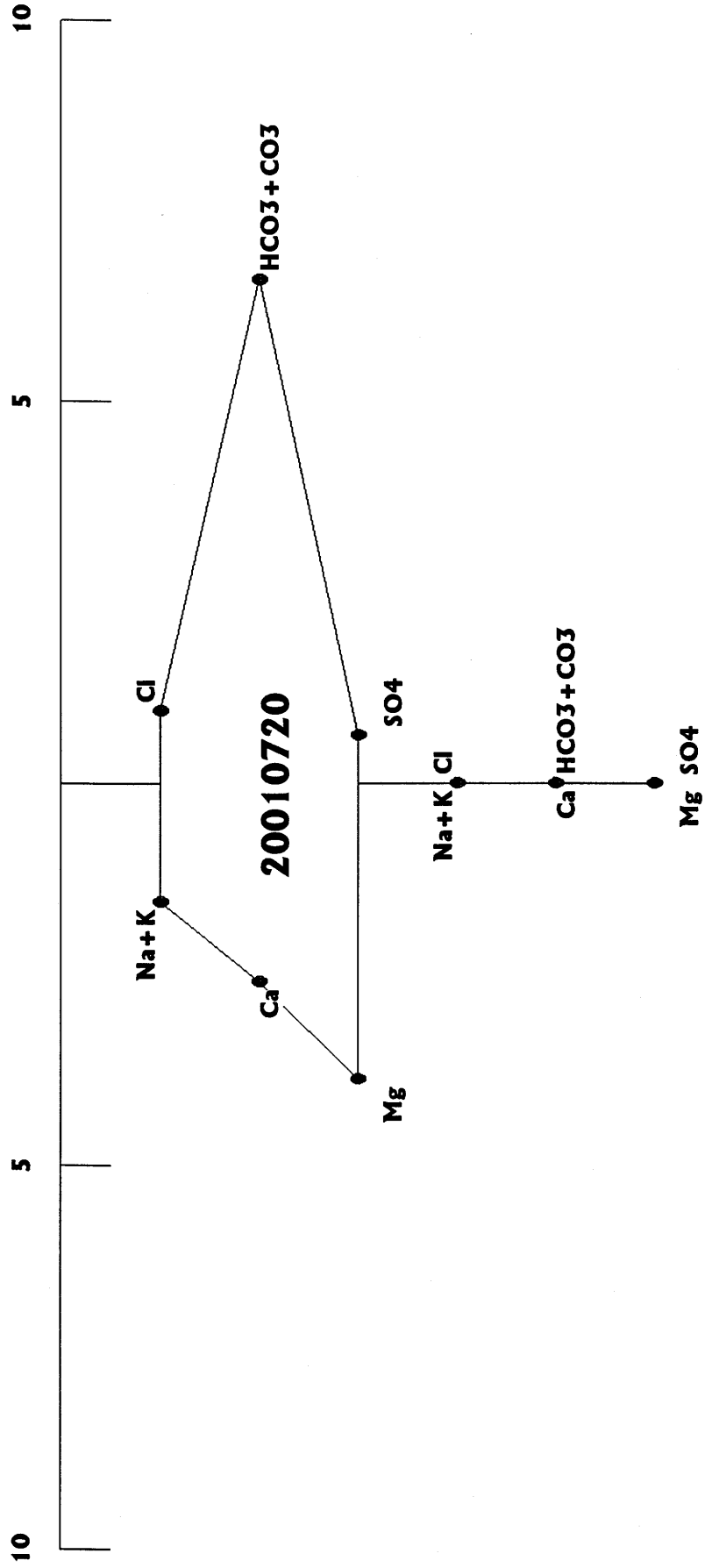
**17-22-1**



# TRAIL MOUNTAIN SPRINGS

17-26-4

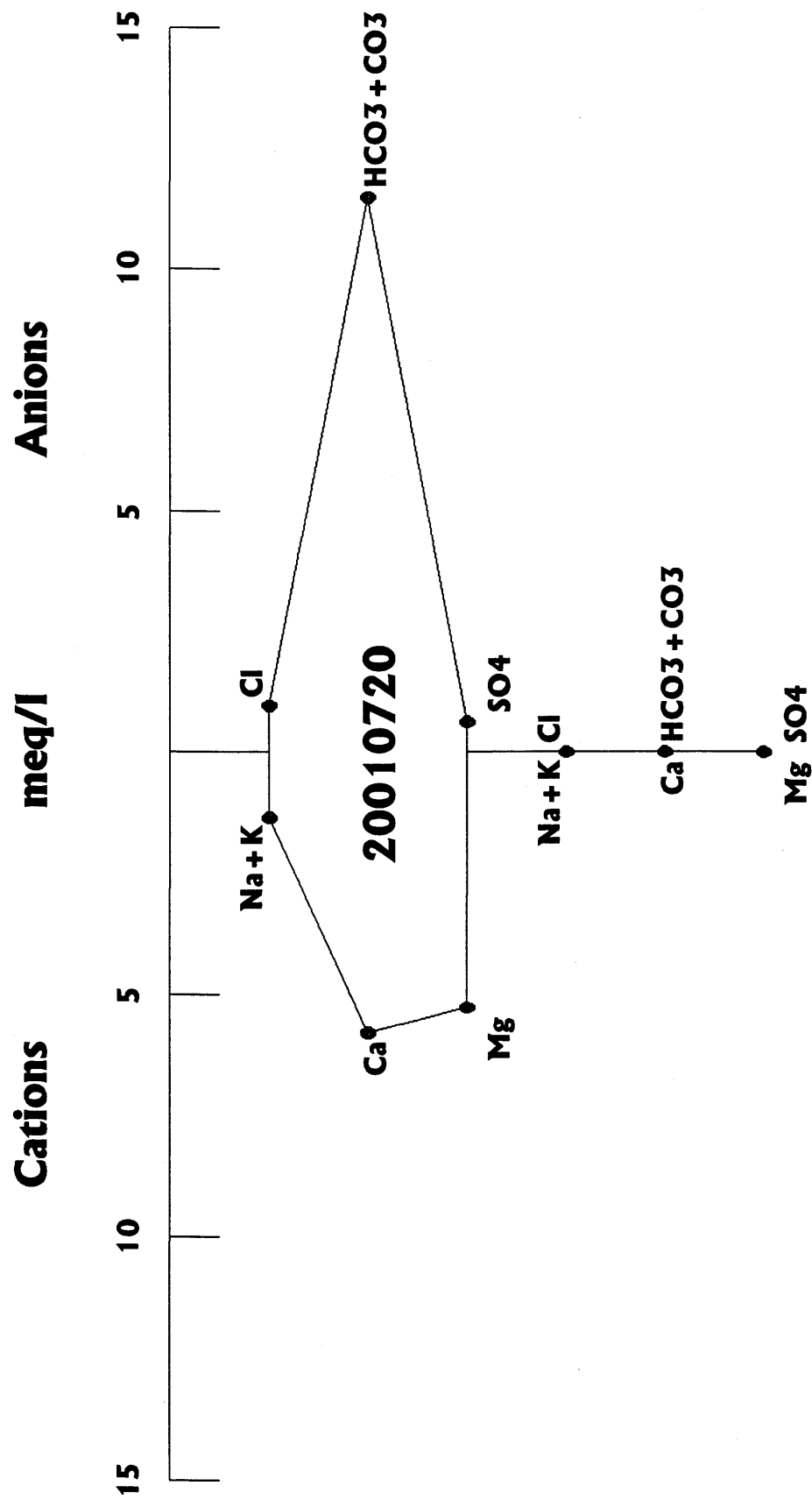
Cations                      meq/l                      Anions



**TRAIL MOUNTAIN SPRINGS  
STIFF DIAGRAMS  
PRICE RIVER FORMATION**

# TRAIL MOUNTAIN SPRINGS

17-25-1



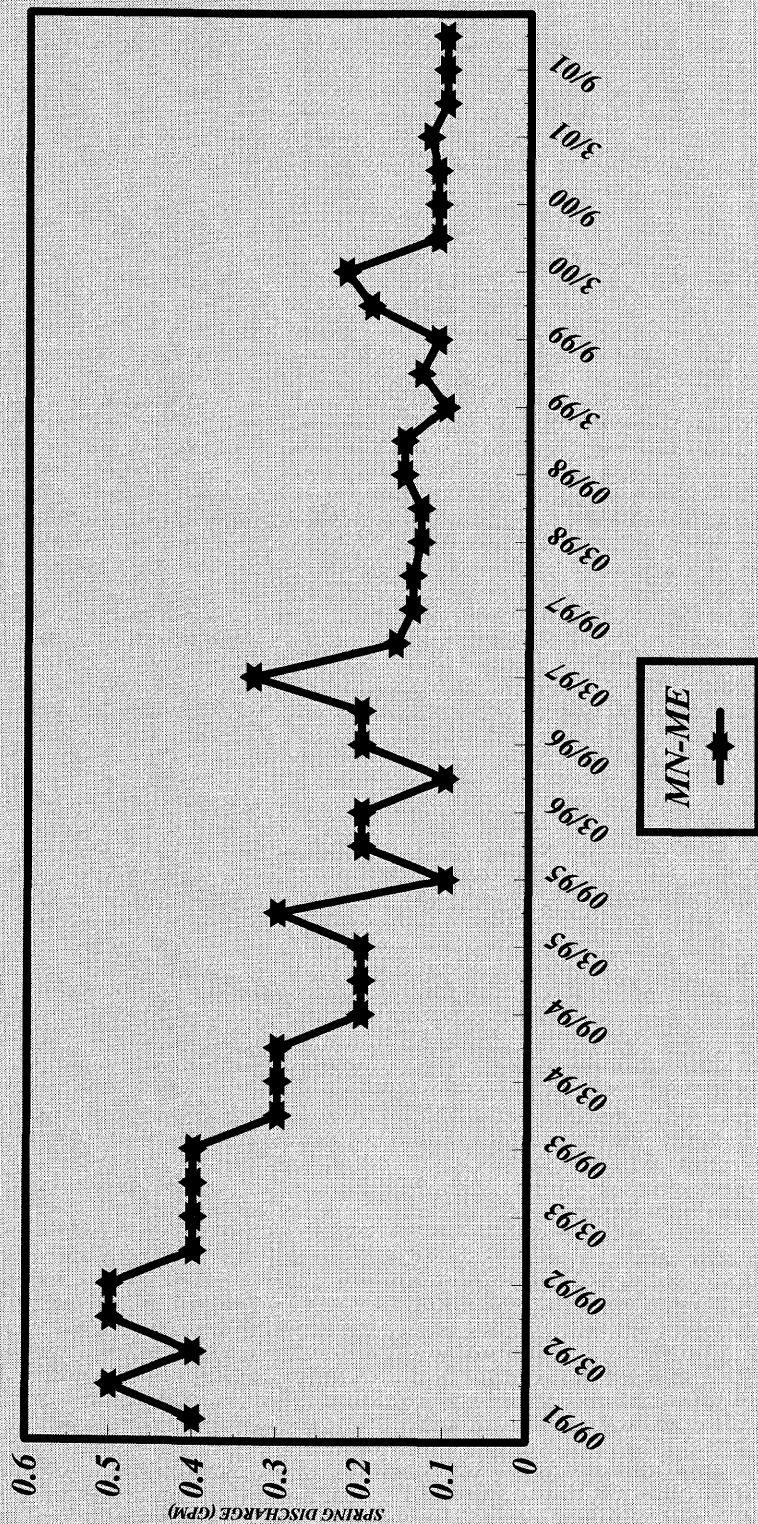
# **APPENDIX J**

## **2001**

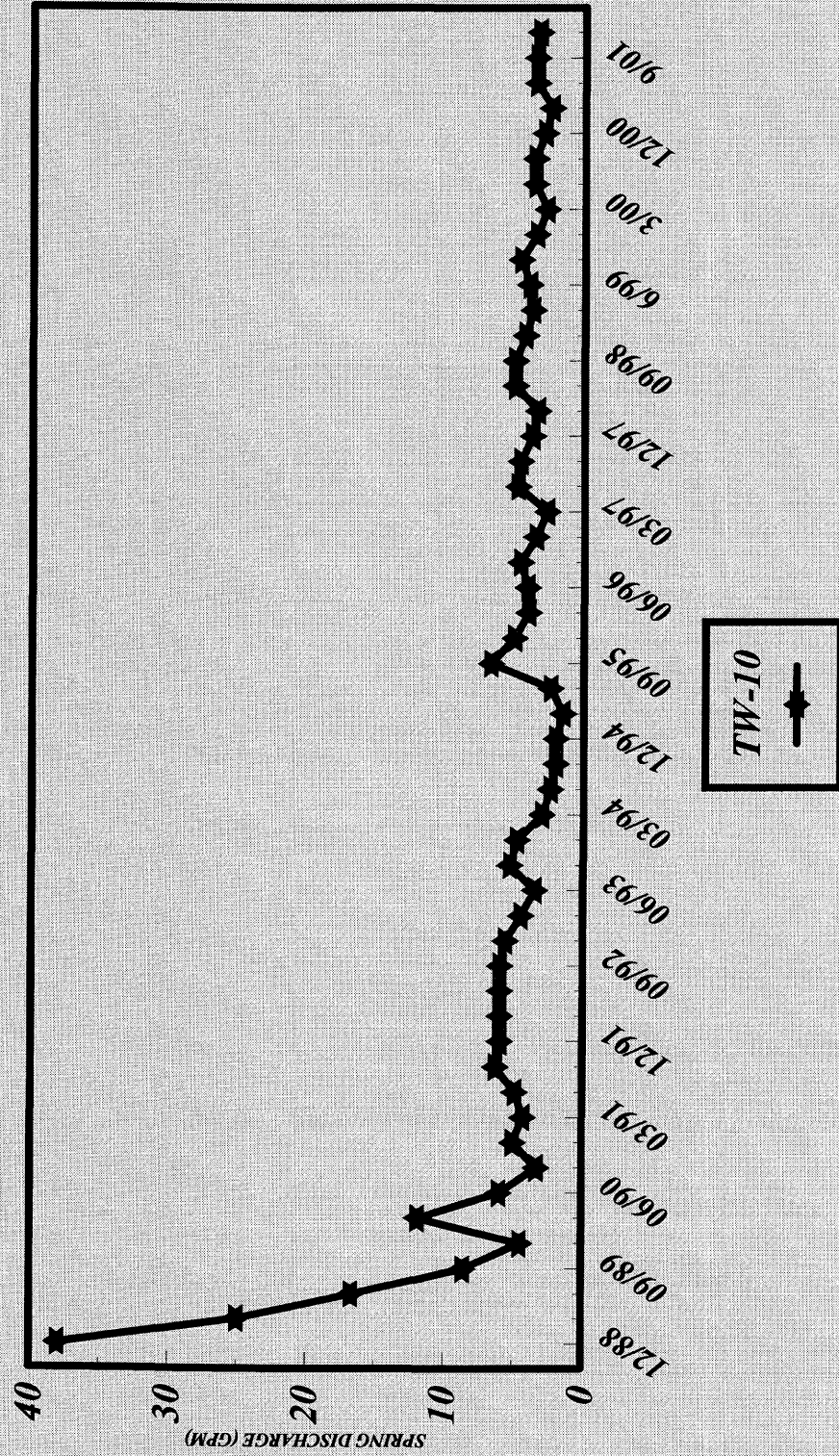


# *Deer Creek In-Mine Monitoring*

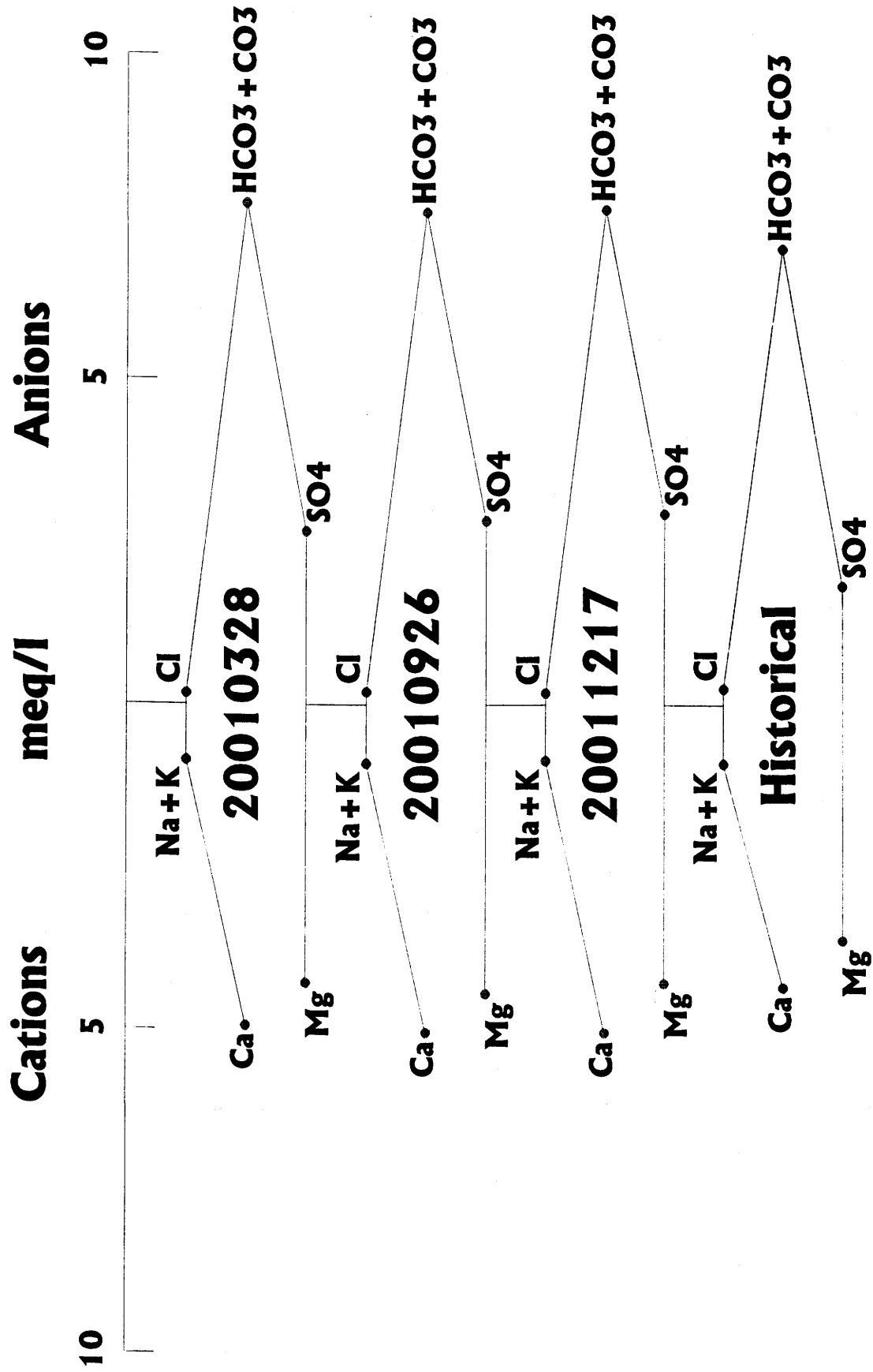
## *Main North - Main East*



# Deer Creek In-Mine Monitoring 3rd North xc-65 (TW-10)



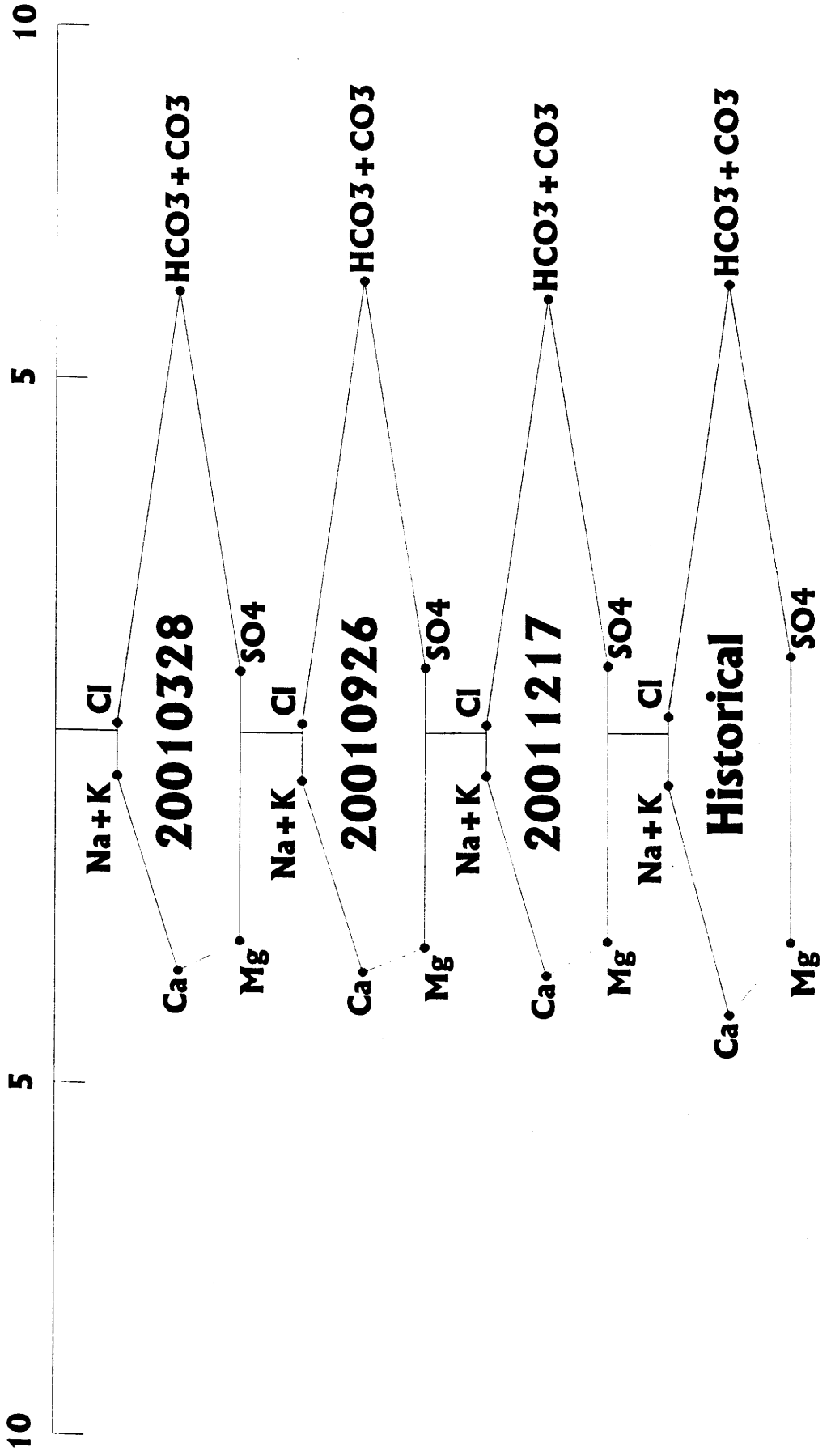
# DEER CREEK IN-MINE MN-ME



# DEER CREEK IN-MINE

## TW-10

Cations meq/l Anions

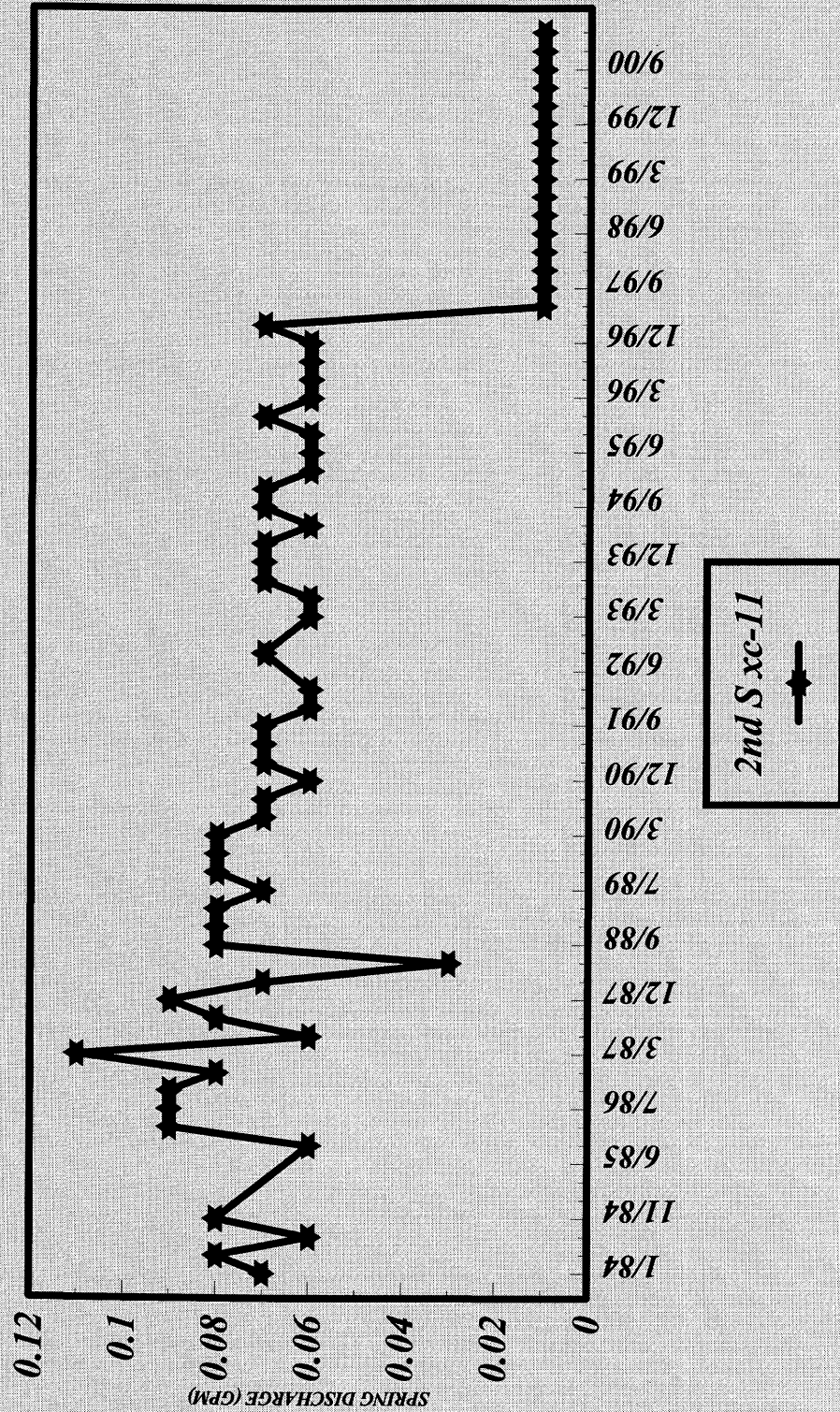


# **APPENDIX K**

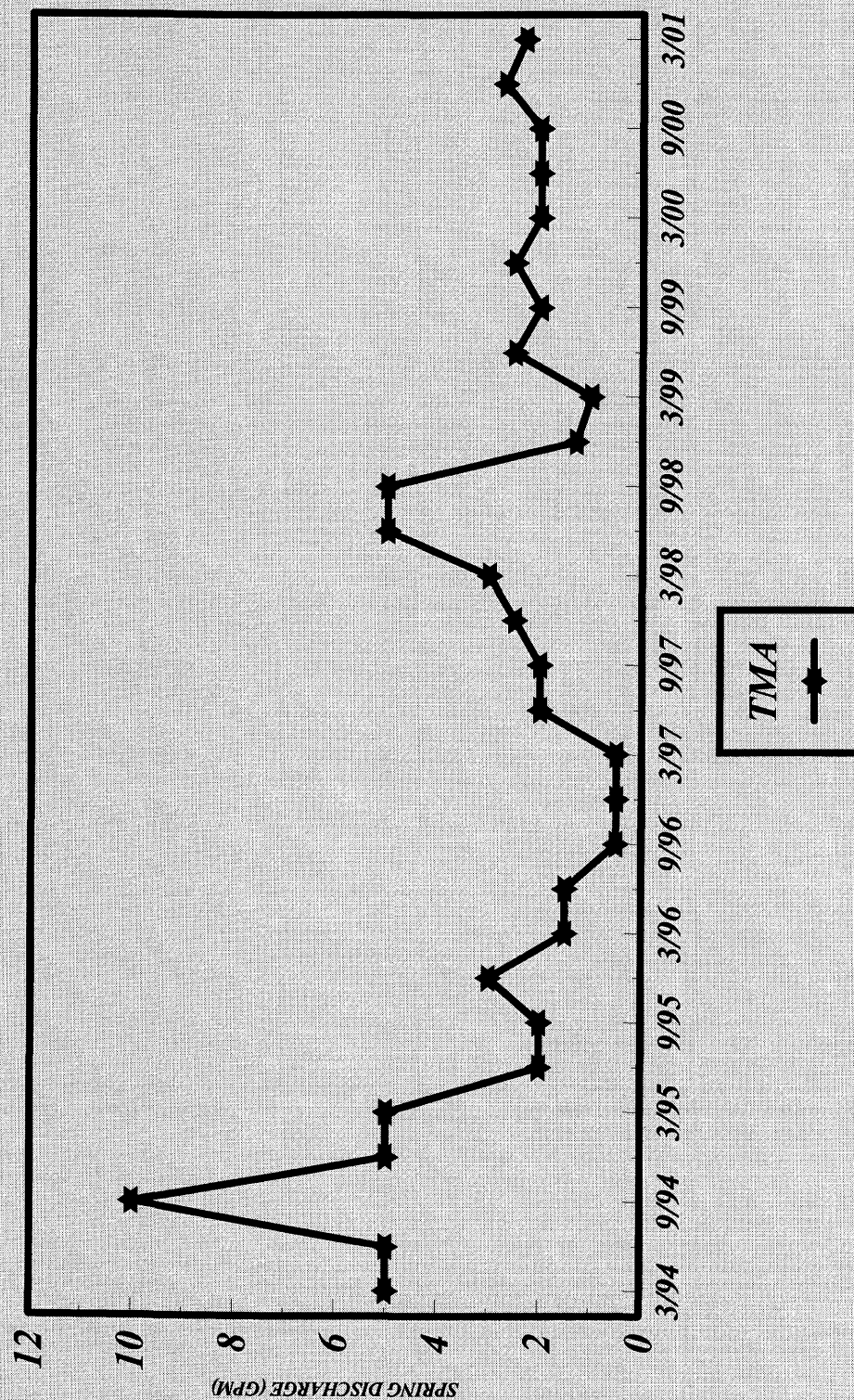
## **2001**



# *Wilberg/Cottonwood In-Mine Monitoring 2nd South xc-11*

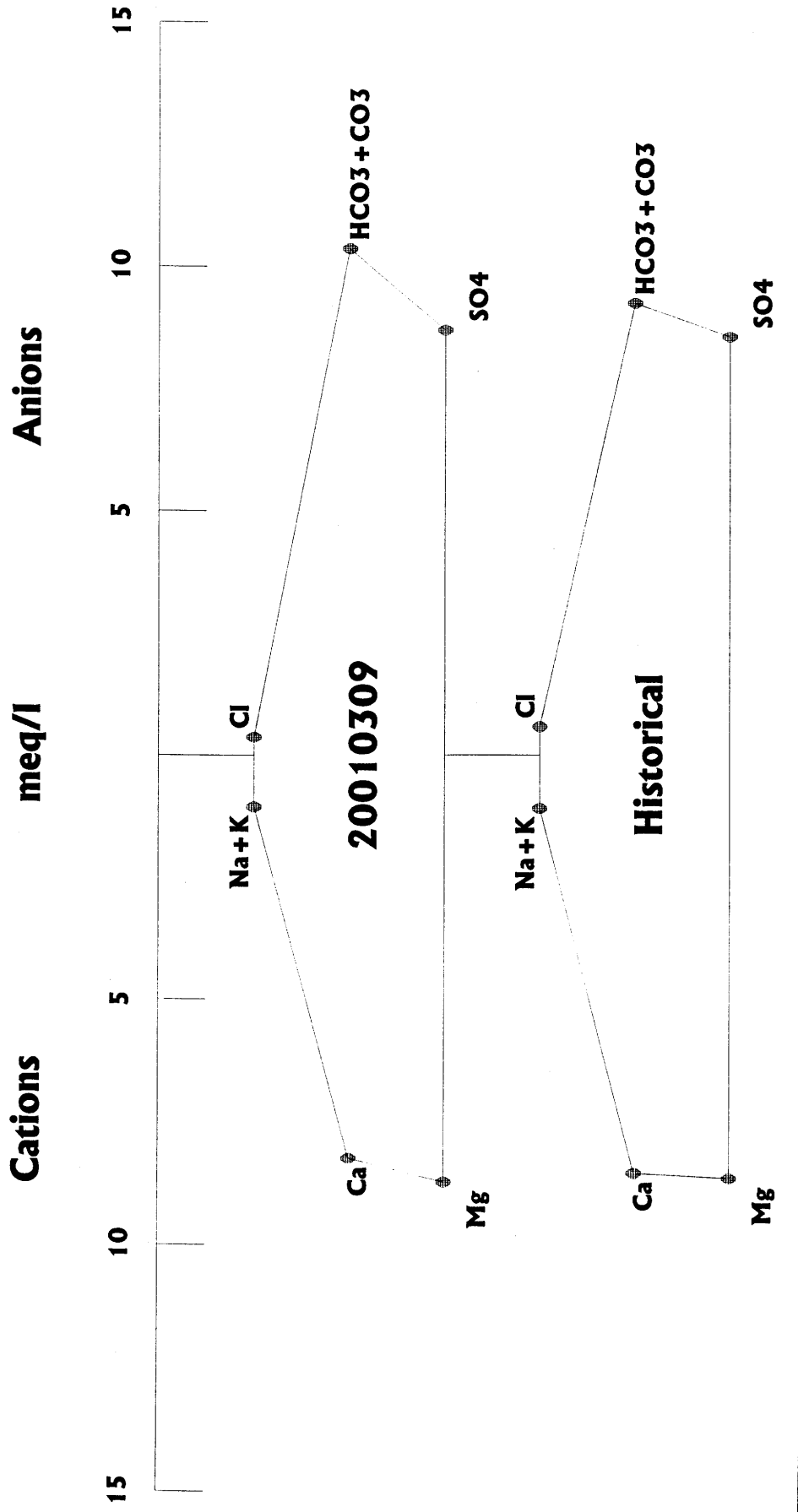


# *Wilberg/Cottonwood In-Mine Monitoring TMA*



# COTTONWOOD IN-MINE

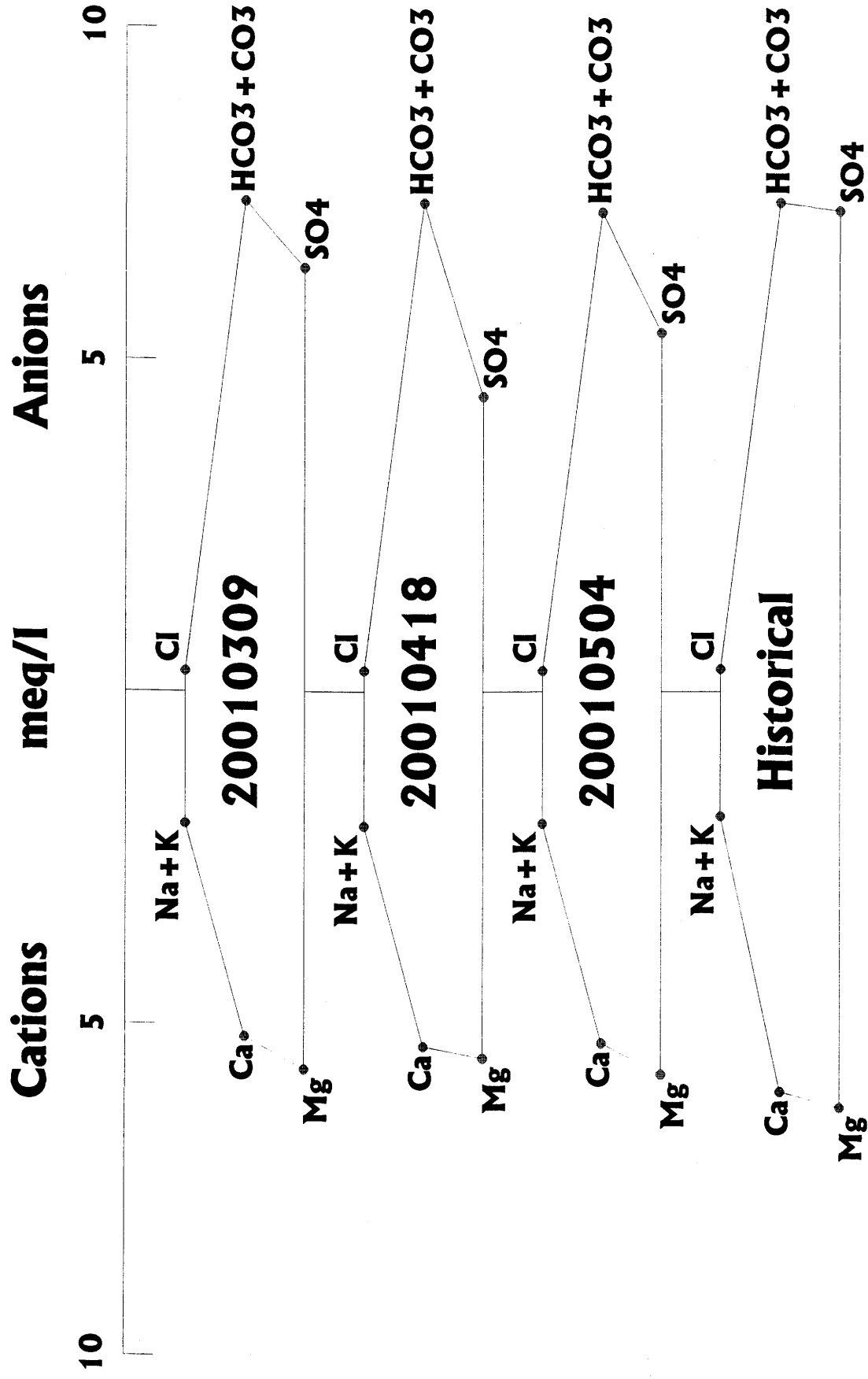
## 2ND SOUTH X-11





# COTTONWOOD IN-MINE

## TMA X-32

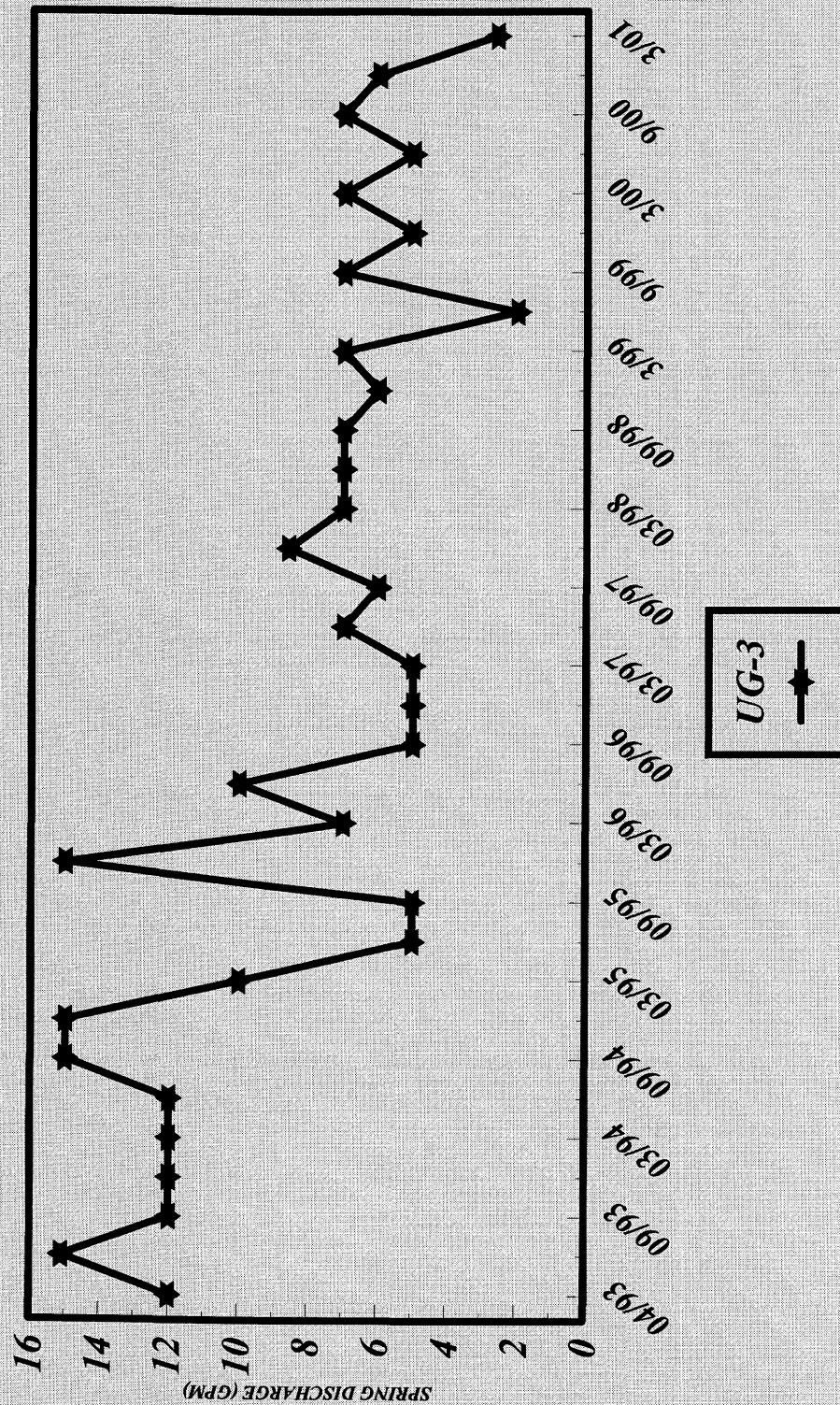


# **APPENDIX L**

## **2001**

# Trail Mountain In-Mine Monitoring

## UG-3



# TRAIL MOUNTAIN IN-MINE

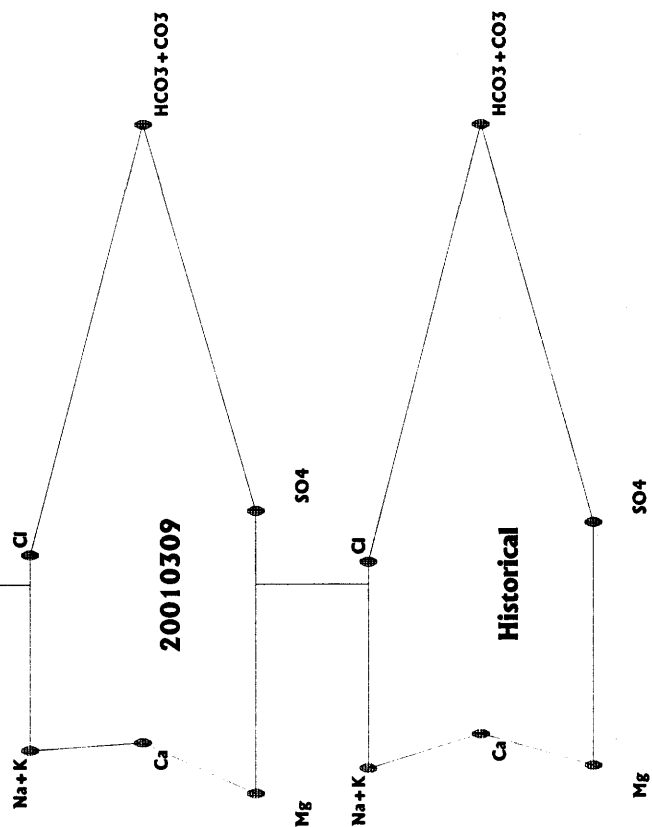
UG-3

Anions

meq/l

Cations

10 5 10 5



# APPENDIX M

## 2001

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## SURFACE PIEZOMETRIC DATA RILDA CANYON

Rilda Canyon (EM-47)		P-1	P-4	P-5	P-6	P-7
Collar Elevation	8,059.0	7,516.8	7,579.3	7,564.8	7,615.5	7,634.9

Date	Reading	Level	Reading	Level	Reading	Level	Reading	Level
01/12/1999	210.2	7,848.8						
02/02/1999	Inaccessible		DAMP		8.1	7,556.7	44.1	7,590.8
03/03/1999	Inaccessible		DAMP		8.2	7,556.6	44.6	7,590.3
04/05/1999	Inaccessible		DAMP		8.1	7,556.7	45.3	7,589.6
05/11/1999	205.6	7,853.4			8.1	7,556.7	45.2	7,589.7
06/07/1999	203.3	7,855.7			7.6	7,557.2	44.7	7,590.3
07/26/1999	202.0	7,857.1			7.6	7,557.2	40.1	7,594.8
08/12/1999	202.4	7,856.6			4.7	7,560.1	39.1	7,594.8
09/03/1999	204.9	7,854.1			7.9	7,556.9	39.2	7,595.8
10/05/1999	206.0	7,853.0			7.8	7,557.0	39.6	7,595.3
11/17/1999	207.9	7,851.1			7.9	7,557.0	41.3	7,593.6
12/9/1999	208.1	7,850.9			8.0	7,556.8	44.6	7,590.3
01/11/2000	Inaccessible				7.5	7,557.3	45.3	7,589.6
02/03/2000	Inaccessible				8.0	7,556.8	45.9	7,589.0
03/09/2000	Inaccessible				8.0	7,556.8	46.3	7,588.6
04/05/2000	Inaccessible				Inaccessible	Inaccessible	Inaccessible	Inaccessible
05/03/2000	205.9	7,853.1			7.9	7,556.9	43.9	7,591.1
06/23/2000	203.2	7,855.8			7.9	7,556.9	39.6	7,595.3
07/06/2000	203.6	7,855.4			7.9	7,556.9	39.4	7,595.5
08/07/2000	204.7	7,854.3			8.1	7,556.7	40.8	7,594.1
09/13/2000	205.6	7,853.4			8.0	7,556.8	45.2	7,589.7
10/10/2000	208.2	7,850.8			8.0	7,556.8	45.7	7,589.2
11/28/2000	Inaccessible				7.4	7,557.4	46.6	7,588.3
12/05/2000	Inaccessible				8.0	7,556.9	46.6	7,588.3
01/05/2001	Inaccessible				8.0	7,556.8	46.9	7,588.0
02/05/2001	Inaccessible				Inaccessible	Inaccessible	Inaccessible	Inaccessible
03/13/2001	Inaccessible				Inaccessible	Inaccessible	Inaccessible	Inaccessible
04/20/2001	Inaccessible				7.9	7,556.9	47.1	7,587.8
05/07/2001	211.6	7,847.4			7.8	7,557.1	44.2	7,590.8
06/29/2001	207.5	7,851.5			7.6	7,557.2	39.9	7,595.0
07/11/2001	206.7	7,852.3			7.7	7,557.1	39.8	7,595.1
08/07/2001	206.1	7,852.9			7.8	7,557.0	39.9	7,595.0
09/12/2001	208.5	7,850.5			7.8	7,557.0	42.9	7,592.0
10/17/2001	211.2	7,847.8			7.8	7,557.1	44.3	7,590.6
11/09/2001	Inaccessible				7.9	7,556.9	45.7	7,589.2
12/12/2001	Inaccessible				7.8	7,557.1	46.3	7,588.6

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

SURFACE PIEZOMETRIC DATA  
COTTONWOOD CANYON

EM-31	CCCW-1A	CCCW-1S	CCCW-2A	CCCW-3A	CCCW-3S U	CCCW-3S L	TM-1B	TM-3										
Collar Elevation	7843.2	7844.5	8133.9	8369.7	8367.6	8366.0	7295.0 EST	6750.0 EST										
Date	Reading	Level	Reading	Level	Reading	Level	Reading	Level										
01/11/1999	-54.3	7363.5	-88.1	7755.1	-188.7	7655.8	-14.7	8119.2	-40.5	8329.3	-62.6	8304.9	-608.8	7757.2	-23.9	7271.1	-151.8	6598.2
02/01/1999	-53.4	7364.4	-83.3	7760.0	-188.8	7655.7	-14.4	8119.4	-40.2	8329.6	-62.5	8305.0	-608.8	7757.2	-23.8	7271.2	-152.6	6597.4
03/01/1999	-53.5	7364.3	-85.5	7757.7	-188.4	7656.1	-14.5	8119.4	-40.3	8329.4	-62.8	8304.7	-608.8	7757.2	-23.8	7271.2	-152.9	6597.1
04/05/1999	-54.1	7363.7	-88.4	7754.8	-188.4	7656.1	-14.6	8119.3	-41.3	8328.4	-63.1	8304.4	-608.6	7757.4	-23.8	7271.2	-152.4	6597.6
05/04/1999	-54.0	7363.8	-90.0	7753.2	-188.2	7656.3	-14.6	8119.3	-42.0	8327.7	-63.7	8303.9	-608.5	7757.5	-23.8	7271.2	-153.1	6596.9
06/07/1999	-54.4	7363.5	-87.5	7755.7	-188.3	7656.2	-13.8	8120.1	-39.2	8330.6	-61.4	8306.2	-608.8	7757.2	-24.0	7271.0	-154.1	6595.9
07/23/1999	-55.3	7362.5	-93.8	7749.4	-188.3	7656.2	-13.8	8120.1	-39.1	8330.6	-61.4	8306.2	-609.2	7756.9	-23.8	7271.2	-155.0	6595.0
08/27/1999	-55.4	7362.4	-92.3	7751.0	-188.2	7656.3	-13.9	8120.0	-40.0	8329.8	-62.6	8305.0	-608.2	7757.8	-24.0	7271.0	-155.6	6594.4
09/03/1999	-55.2	7362.6	-92.1	7751.1	-187.8	7656.7	-13.9	8119.9	-40.6	8329.2	-62.7	8304.8	-608.8	7757.2	-24.0	7271.0	-155.5	6594.5
10/04/1999	-56.0	7361.8	-94.7	7748.5	-188.0	7656.5	-14.6	8119.3	-41.0	8328.7	-63.5	8304.0	-609.1	7756.9	-24.0	7271.0	-156.0	6594.1
11/17/1999	-55.4	7362.4	-99.0	7744.2	-187.5	7657.0	-14.8	8119.1	-42.2	8327.5	-64.2	8303.4	-609.0	7757.1	-24.0	7271.0	-153.9	6596.1
12/03/1999	-55.3	7362.6	-99.6	7743.6	-187.7	7656.8	-14.9	8119.0	-42.3	8327.4	-64.3	8303.2	-608.9	7757.1	-24.0	7271.0	-153.9	6596.1
01/10/2000	-55.3	7362.5	-97.9	7745.3	-187.8	7656.7	-15.1	8118.8	-42.4	8327.3	-64.5	8303.1	-608.9	7757.1	-23.9	7271.2	-154.7	6595.3
02/02/2000	-54.9	7363.0	-93.1	7750.1	-188.4	7656.1	-15.3	8118.6	-42.3	8327.5	-64.6	8303.0	-609.4	7756.6	-23.9	7271.2	-155.6	6594.4
03/06/2000	-54.5	7363.3	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	Inaccessible	-23.9	7271.1	-155.8	6594.2
04/05/2000	-54.7	7363.1	-94.7	7748.5	-188.4	7656.1	-15.4	8118.5	-42.1	8327.6	-65.1	8302.5	-609.2	7756.9	-23.9	7271.1	-156.1	6594.0
05/05/2000	-54.8	7363.0	-96.5	7746.7	-188.4	7656.1	-15.6	8118.3	-43.8	8325.9	-65.5	8302.0	-609.2	7756.8	-24.0	7271.0	-156.4	6593.6
06/13/2000	-55.8	7362.0	-100.8	7742.4	-188.8	7655.7	-15.8	8118.0	-44.5	8325.2	-66.6	8301.0	-608.5	7757.5	-23.8	7271.2	-157.3	6592.7
07/06/2000	-56.0	7361.8	-103.2	7740.0	-188.9	7655.6	-16.0	8117.9	-45.6	8324.1	-67.1	8300.5	-609.4	7756.6	-23.8	7271.2	-157.5	6592.5
08/09/2000	-56.5	7361.4	-106.5	7736.8	-189.2	7655.3	-16.4	8117.5	-46.3	8323.4	-67.9	8299.7	-609.6	7756.4	-23.8	7271.2	-158.1	6591.9
09/11/2000	-56.3	7361.5	-108.3	7735.0	-189.5	7655.0	-16.8	8117.1	-46.9	8322.9	-68.5	8299.1	-609.7	7756.4	-24.0	7271.0	-158.2	6591.8
10/10/2000	-56.1	7361.7	-109.5	7733.7	-189.4	7655.1	-17.0	8116.9	-47.3	8322.5	-68.8	8298.7	-609.4	7756.6	-23.8	7271.2	-157.5	6592.5
11/28/2000	-51.1	7366.8	-108.6	7734.6	-189.8	7654.5	-17.3	8116.6	-47.7	8322.0	-69.2	8298.4	-609.7	7756.3	-23.8	7271.2	-154.5	6595.5
12/04/2000	-51.3	7366.5	-108.5	7734.7	-190.0	7654.5	-17.4	8116.5	-47.7	8322.0	-69.3	8298.3	-609.9	7756.1	-23.8	7271.2	-152.8	6597.2
01/03/2001	-51.7	7366.1	-105.1	7738.1	-190.1	7654.4	-17.5	8116.4	-47.6	8322.1	-69.3	8298.2	-610.0	7756.0	-23.8	7271.2	-144.6	6605.4
02/05/2001	-51.4	7366.4	-102.4	7740.8	-189.8	7654.7	-17.6	8116.3	-48.1	8321.6	-69.6	8298.0	-609.8	7756.2	-23.8	7271.2	-136.3	6613.7
03/08/2001	-51.7	7366.1	-103.0	7740.2	-190.0	7654.5	-17.8	8116.1	-48.1	8321.6	-69.4	8298.1	-609.7	7756.3	-23.7	7271.2	-129.1	6620.9
04/05/2001	-53.7	7364.1	-99.6	7743.6	-189.9	7654.6	-17.6	8116.3	-48.1	8321.7	-70.0	8297.6	-610.1	7755.9	-23.7	7271.3	-122.6	6627.4
05/07/2001	-55.0	7362.9	-99.9	7743.3	-190.1	7654.4	-17.8	8116.1	-48.6	8321.1	-70.0	8297.6	-610.1	7755.9	-23.7	7271.3	-115.6	6634.5
06/25/2001	-56.2	7361.6	-104.8	7738.5	-190.0	7654.5	-18.0	8115.9	-48.9	8320.8	-70.1	8297.5	-610.0	7756.0	-23.7	7271.3	-105.0	6645.0
07/05/2001	-56.1	7361.7	-106.3	7736.9	-190.1	7654.4	-18.1	8115.6	-49.0	8320.7	-70.6	8297.0	-610.2	7755.8	-23.7	7271.3	-96.5	6653.5
08/11/2001	-58.6	7359.2	-109.5	7733.7	-190.4	7654.1	-18.3	8115.6	-49.0	8320.9	-70.9	8296.6	-610.2	7755.8	-24.0	7271.0	-91.0	6659.0
09/11/2001	-57.1	7360.7	-110.2	7733.0	-190.6	7653.9	-18.6	8115.2	-48.8	8320.9	-71.2	8296.3	-610.3	7755.7	-24.1	7270.9	-88.7	6661.3
10/03/2001	-56.9	7360.9	-110.2	7733.0	-190.5	7654.0	-18.6	8115.3	-49.5	8320.2	-72.6	8295.0	-610.6	7755.4	-23.8	7271.3	-83.0	6667.0
11/09/2001	-60.0	7357.8	-110.6	7732.6	-190.9	7653.6	-19.4	8114.5	-49.8	8319.9	-72.6	8295.0	-610.6	7755.4	-23.7	7271.3	-78.0	6672.0
12/10/2001	-55.2	7362.6	-110.7	7732.5	-190.3	7654.2	-19.0	8114.9	-50.0	8319.7	-71.7	8295.9	-609.9	7756.2	-23.7	7271.3	-75.4	6674.6
01/03/2002	-55.5	7362.3	-110.5	7732.8	-190.8	7653.7	-19.2	8114.7	-50.2	8319.5	-71.8	8295.8	-610.4	7755.7	-23.8	7271.2	-71.7	6678.3
02/05/2002	-54.1	7363.7	-110.2	7733.0	-191.1	7653.4	-19.3	8114.6	-50.2	8319.5	-72.0	8295.6	-610.4	7755.6	-23.7	7271.3	-71.7	6678.3

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## DEER CREEK IN -MINE PIEZOMETRIC DATA

	DCP - 1 3rd N. xc-8	DCP - 2 3rd N. xc-29	DCP - 3 3rd N. xc-55	DCP - 4 1st WM xc-29
<b>Elevation</b>	7530	7567	7577	7529
<b>DRILL</b>				
<b>DEPTH</b>	155.4	170.5	148.9	169.6

Date	Reading	Level	Reading	Level	Reading	Level	Reading	Level
12-15-95	0.0	7530.0						
03/29/1996	0.1	7530.1						
06/19/1996	0.0	7530.0						
09/30/1996	0.0	7530.0						
12/12/1996	1.6	7531.6						
03/27/1997	1.6	7531.6						
06/30/1997	1.6	7531.6						
09/25/1997	1.6	7531.6						
12/09/1997	1.6	7531.6						
03/30/1998	1.6	7531.6						
06/22/1998	1.6	7531.6						
09/23/1998	1.6	7531.6						
12/22/1998	1.6	7531.6						
03/29/1999	1.6	7531.6						
06/25/1999	1.6	7531.6						
09/29/1999	1.6	7531.6						
12/13/1999	1.6	7531.6						
03/30/2000	1.6	7531.6						
06/16/2000	1.6	7531.6						
09/20/2000	1.6	7531.6						
12/12/2000	1.6	7531.6						
03/15/2001	1.6	7531.6						
06/18/2001	1.6	7531.6						
09/26/2001	1.6	7531.6						
12/17/2001	1.6	7531.6						

\* Area inaccessible

\*\* Monitoring discontinued, hole caved @ 38'

\*\*\* Monitoring discontinued, entry used to access to 8th East

\*\*\*\* Monitoring discontinued, area sealed



# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### WASTE ROCK DISPOSAL WELLS DATA

DEER CREEK  
DCWR1

WILBERG\COTTONWOOD  
WCWR1

* Collar			Elevations Adjusted 12/90		
Elevation					
6313.4			6774.5		
Date	Reading	Level	Date	Reading	Level
03/17/1998	-7.5	6305.9	12/10/1998	-41.88	6732.6
06/09/1998	-7.0	6306.4	03/01/1999	-42.4	6732.1
09/15/1998	-6.2	6307.2	06/09/1999	-47.48	6727.0
12/07/1998	-6.0	6307.4	09/09/1999	-50.04	6724.5
03/04/1999	-6.0	6307.4	12/08/1999	-51.34	6723.2
06/17/1999	-7.5	6305.9	03/08/2000	-51.86	6722.6
09/09/1999	-7.5	6305.9	06/15/2000	-51.84	6722.7
12/14/1999	-7.8	6305.6	09/13/2000	-52.2	6722.3
03/10/2000	-7.5	6305.9	12/04/2000	-44.62	6729.9
06/20/2000	-8.6	6304.8	03/08/2001	-44.2	6730.3
09/25/2000	-8.3	6305.1	06/26/2001	-46.18	6728.3
12/05/2000	-8.3	6305.1	09/20/2001	-50.18	6724.3
03/13/2001	-5.3	6308.1	12/12/2001	-51.35	6723.2
06/29/2001	-7.2	6306.2			
09/17/2001	-6.9	6306.5			
12/13/2001	-6.5	6306.9			

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## COTTONWOOD CANYON CREEK FLOW & QUALITY

SW-1

Date	Time	Temp. (oC)	Field Measurements		Cond. (uS)	Dis. Oxygen	Weather	Comments
			Flow GPM	pH				
01/05/1999	1034		200					clear30's
02/01/1999	1433		200					clear30's
03/01/1999	1059	3.1	210	7.92	549	6.1		clear40's
04/07/1999	1108		200					cloudy40's
05/05/1999	1345		320					ptcloudy50's
06/08/1999	1058	6.6	1100	7.92	453	7.9		ptcloudy60's
07/16/1999	1455		310					cloudy70's
08/03/1999	1319		300					cloudy60's
09/02/1999	1308	10.6	235	8.13	449	6.6		ptcloudy60's
10/04/1999	1403		200					clear70's
11/01/1999	1314		200					clear60's
12/06/1999	1306	-0.4	200	7.44	499	10.8		clear30's
01/11/2000	1043		200					cloudy40's
02/02/2000	1104		200					ptcloudy40's
03/06/2000	1249		INACCESSIBLE SNOW					snow30's
04/05/2000	1044		250					clear40's
05/05/2000	1422		300					clear60's
06/12/2000	1325	13.3	70	7.94	463	10.8		cloudy80's
07/06/2000	1137		80					clear80's
08/09/2000	1328		60					ptcloudy90's
09/12/2000	1346	15.6	60	8.33	486	7		clear80's
10/10/2000	1055		40					cloudy50's
11/06/2000	1050		30					cloudy30's
12/04/2000	1111		Frozen					clear30's
01/03/2001	1052		Frozen					clear30's
02/05/2001	1120		15					clear30's
03/08/2001	1225	7.5	30	8.15	803	2.3		clear40's
04/05/2001	1235		65					cloudy40's
05/09/2001	1112		110					clear60's
06/06/2001	1048	8.6	175	7.69	579			clear60's
07/05/2001	1349		70					ptcloudy80's
08/14/2001	1408		30					clear80's
09/20/2001	1035	8.1	1	8.42	729			clear80's
10/03/2001	1151		1					clear70's
11/09/2001	1119		4					clear40's
12/10/2001	1330		Frozen					cloudy20's

## COTTONWOOD CANYON CREEK FLOW & QUALITY

## Field Measurements

[illegible]

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## COTTONWOOD CANYON CREEK FLOW & QUALITY

SW-3

Date	Time	Field Measurements ---					Weather	Comments
		Temp. (oC)	Flow GPM	pH	Cond. (uS)	Dis. Oxygen		
01/05/1999	1054		405				clear30's	
02/01/1999	1500		340				clear30's	
03/01/1999	1142	6.4	835	8.36	1026	5.9	clear40's	
04/07/1999	1122		450				cloudy40's	
05/05/1999	1400		523				ptcloudy50's	
06/08/1999	1142	9	1255	8.42	621	7.6	ptcloudy60's	
07/16/1999	1512		800				cloudy70's	
08/03/1999	1337		341				cloudy60's	
09/02/1999	1348	14.8	634	8.69	881	6.2	cloudy60's	
10/04/1999	1426		243				clear70's	
11/01/1999	1330		245				clear60's	
12/06/1999	1417	0.5	209	8.55	1122	10.6	clear30's	
01/11/2000	1105		328				cloudy40's	
02/02/2000	1129		220				ptcloudy40's	
03/06/2000	1339	1.5	199	8.34	2390	8.9	cloudy30's	salt from road
04/05/2000	1052		838				clear40's	
05/03/2000	1324		569				clear60's	
06/12/2000	1410	17.4	119	8.77	1079	9.6	cloudy80's	
07/06/2000	1156		699				clear80's	
08/09/2000	1351		270				ptcloudy90's	
09/12/2000	1430	18.4	293	9.08	1150	7.1	clear80's	
10/10/2000	1117		601				cloudy50's	
11/06/2000	1102		633				cloudy30's	
12/04/2000	1141	-0.2	318	8.32	1195	10.4	clear30's	
01/03/2001	1119		110				clear30's	
02/05/2001	1210		Frozen				clear30's	
03/08/2001	1336	7.9	121	8.64	1064	3.8	clear40's	
04/05/2001	1300		88				cloudy40's	
05/09/2001	1125		120				clear60's	
06/06/2001	1127	13.5	197	8.3	822		clear60's	
07/05/2001	1409		58				ptcloudy80's	
08/14/2001	1412		50				clear80's	
09/20/2001	1146	14.5	38	8.43	1910		clear80's	
10/03/2001	1210		31				clear70's	
11/09/2001	1159		54				clear40's	
12/12/2001	1040		Frozen				clear20's	

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

COTTONWOOD CANYON CREEK  
@ USGS FLUME  
CCC01

Date	Time	Temp. (°C)	Field Measurements			Cond. (uS)	Dis. Oxygen	Weather
			Flow ft.	GPM	pH			
01/05/1999	1050			400				clear30's
02/01/1999	1454			339				clear30's
03/01/1999	1131	7		834	8.52	1001	5.7	clear40's
04/07/1999	1117			448				cloudy40's
05/05/1999	1354			522				ptcloudy50's
06/08/1999	1126	8		1253	8.27	454		ptcloudy60's
07/16/1999	1431			798				cloudy70's
08/03/1999	1330			339				cloudy60's
09/02/1999	1336	13		631	8.61	888		cloudy60's
10/04/1999	1421			241				clear70's
11/01/1999	1323			241				clear60's
12/06/1999	1359	2		207	7.64	632	11.2	clear30's
01/11/2000	1101			326				cloudy40's
02/02/2000	1125			218				ptcloudy40's
03/06/2000	1314	2		197	8.51	1333	7.2	cloudy30's
04/05/2000	1056			834				clear40's
05/03/2000	1317			567				clear60's
06/12/2000	1356	15		117	8.67	787	9	cloudy80's
07/06/2000	1153			696				clear80's
08/09/2000	1346			264				ptcloudy90's
09/12/2000	1417	18		289	9.05	1122	7.2	clear80's
10/10/2000	1112			599				cloudy50's
11/06/2000	1059			631				cloudy30's
12/04/2000	1130	4		314	7.9	1172	10.2	clear30's
01/03/2001	1113			100				clear30's
02/05/2001	1205			frozen-no flow				clear30's
03/08/2001	1320	8		117	8.84	1008	3	clear40's
04/05/2001	1251			83				cloudy40's
05/09/2001	1121			117				clear60's
06/06/2001	1116	10		190	8.42	588		clear60's
07/05/2001	1404			54				ptcloudy80's
08/14/2001	1418			54				clear80's
09/20/2001	1134	12		35	8.6	1017		clear80's
10/03/2001	1206			30				clear70's
11/09/2001	1154			52				clear40's
12/12/2001	1033			frozen-no flow				clear20's

## UN-NAMED DRAINAGE OFF STRAIGHT CANYON CREEK

[illegible]

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## DEER CREEK FLOW & QUALITY

### ABOVE THE MINE - DCR01

<----- Field Measurements ----->							
Date	Time	Temp. (°C)	Flow		pH	Cond. (uS)	Weather
			ft.	GPM			
01/12/1999	1145			Frozen			clear30's
02/02/1999	1347			Frozen			cloudy30's
03/04/1999	859			Frozen			ptcloudy40's
04/13/1999	1440			Frozen			clear50's
05/10/1999	1509			556			ptcloudy50's
06/14/1999	1425	9.8		675	7.93	456	sunny80's
07/26/1999	1148			252			cloudy80's
08/12/1999	1220			252			ptcloudy70's
09/13/1999	1429	6.9		134	7.83	503	clear70's
10/05/1999	1508			101			clear70's
11/17/1999	1447			Frozen			ptcloudy50's
12/09/1999	1243			Frozen			cloudy20's
01/17/2000	948			Frozen			ptcloudy40's
02/03/2000	1345			Frozen			clear40's
03/09/2000	1430			Frozen			ptcloudt30's
04/05/2000	1410			Frozen			ptcloudy50's
05/01/2000	1435			737			clear60's
06/20/2000	1037	6.3		210	8.25	499	clear80's
07/06/2000	1524			134			clear80's
08/07/2000	1534			45.8			ptcloudy90's
09/11/2000	1451	9		40	8.71	535	clear80's
10/12/2000	1426			80			clear40's
11/06/2000	1515			Frozen			cloudy30's
12/05/2000	1116			Frozen			clear30's
01/05/2001	1256			Frozen			clear40's
02/05/2001	1424			Frozen			ptcloudy40's
03/13/2001	1345			Frozen			clear40's
04/23/2001	1120			Frozen			clear40's
05/14/2001	1328			1462			clear60's
06/29/2001	1020	8.4		117	8.68	583	clear80's
07/11/2001	1000			274			clear80's
08/07/2001	1522			134			cloudy80's
09/12/2001	1346	7.9		101	7.67	599	ptcloudy70's
10/17/2001	1207			71.5			cloudy50's
11/08/2001	1102			95			clear40's
12/10/2001	1455			Frozen			cloudy20's

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## DEER CREEK FLOW & QUALITY

@ PERMIT BOUNDARY - DCR04

Date	Time	Field Measurements				Cond. (uS)	Weather
		Temp. (°C)	Flow ft.	GPM	pH		
01/12/1999	1153			817			clear30's
02/02/1999	1356			1934			cloudy30's
03/04/1999	905	8.5		994	8.15	852	ptcloudy40's
04/13/1999	1446			994			clear50's
05/10/1999	1518			2420			ptcloudy50's
06/14/1999	1458	11.1		1596	7.77	645	sunny80's
07/26/1999	1155			1934			cloudy80's
08/12/1999	1229			1183			ptcloudy70's
09/13/1999	1445	11.2		1183	8.17	691	clear70's
10/05/1999	1516			817			clear70's
11/17/1999	1455			2112			ptcloudy50's
12/09/1999	1305	6.4		1282	8.07	793	cloudy20's
01/17/2000	1000			1384			ptcloudy40's
02/03/2000	1355			1087			clear40's
03/09/2000	1438	7.9		1762	8.34	1135	ptcloudy30's
04/05/2000	1416			1183			ptcloudy50's
05/01/2000	1443			2295			clear60's
06/20/2000	1057	11.4		1596	8.35	733	clear80's
07/06/2000	1532			1384			clear80's
08/07/2000	1541			1282			ptcloudy80's
09/11/2000	1510	12		1183	8.6	736	clear80's
10/12/2000	1444			1183			clear40's
11/06/2000	1525			1384			cloudy30's
12/05/2000	1132	5.6		2172	8.19	938	clear30's
01/05/2001	1305			2357			clear40's
02/05/2001	1432			1282			ptcloudy40's
03/13/2001	1353	9.1		1087	8.64	1218	clear40's
04/23/2001	1128			1333			clear40's
05/14/2001	1335			1934			clear60's
06/29/2001	1036	10.1		817	8.57	669	clear80's
07/11/2001	1025			734			clear80's
08/07/2001	1531			1706			cloudy80's
09/12/2001	1405	11.5		1384	8.52	754	ptcloudy70's
10/17/2001	1214			1282			cloudy60's
11/08/2001	1110			1183			clear40's
12/10/2001	1507	9.4		1384	8.42	956	cloudy20's



# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### DEER CREEK FLOW & QUALITY

#### BELOW THE MINE - DCR06

<----- Field Measurements ----->							Weather
Date	Time	Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)	
01/12/1999	1200			800			clear30's
02/02/1999	1404			1923			cloudy30's
03/04/1999	930	5.1		996	8.17	913	ptcloudy40's
04/13/1999	1453			995			clear50's
05/10/1999	1525			2425			ptcloudy50's
06/14/1999	1515	14.6		1600	8.24	727	sunny80's
07/26/1999	1203			1940			cloudy80's
08/12/1999	1235			1190			ptcloudy70's
09/13/1999	1500	14.8		1190	8.47	710	clear70's
10/05/1999	1524			820			clear70's
11/17/1999	1504			2115			ptcloudy50's
12/09/1999	1329	3.8		1290	7.87	857	cloudy20's
01/17/2000	1010			1390			ptcloudy40's
02/03/2000	1403			1090			clear40's
03/09/2000	1459	7.7		1766	8.46	1090	ptcloudy30's
04/05/2000	1423			1190			ptcloudy50's
05/01/2000	1450			2300			clear60's
06/20/2000	1112	12.6		1600	8.37	810	clear80's
07/06/2000	1543			1390			clear80's
08/07/2000	1556			1290			ptcloudy80's
09/11/2000	1527	16		1191	8.7	758	clear80's
10/12/2000	1449			1187			clear40's
11/06/2000	1530			1382			cloudy30's
12/05/2000	1149	3.5		2180	7.9	863	clear30's
01/05/2001	1314			2346			clear40's
02/05/2001	1437			1276			ptcloudy40's
03/13/2001	1410	9.8		1080	8.75	1299	clear40's
04/23/2001	1140			1329			clear40's
05/14/2001	1341			1910			clear60's
06/29/2001	1056	13.9		812	8.69	825	clear80's
07/11/2001	1035			730			clear80's
08/07/2001	1538			1702			cloudy80's
09/12/2001	1415	15		1380	8.58	756	ptcloudy70's
10/17/2001	1225			1280			cloudy60's
11/08/2001	1116			1176			clear40's
12/10/2001	1526			1380			cloudy20's

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## GRIMES WASH FLOW & QUALITY

### RIGHT FORK - GWR01

← Field Measurements →							Weather
Date	Time	Temp. (°C)	Flow ft.	GPM	pH	Cond. (uS)	
01/05/1999	1116		no flow				clear30's
02/01/1999	1510		no flow				clear30's
03/03/1999	1035		no flow				cloudy50's
04/07/1999	1250		no flow				cloudy40's
05/05/1999	1421		no flow				ptcloudy50's
06/08/1999	1209		no flow				ptcloudy60's
07/23/1999	1115		no flow				sunny70's
08/03/1999	1420		no flow				cloudy60's
09/02/1999	1400		no flow				cloudy60's
10/04/1999	1430		no flow				clear70's
11/01/1999	1339		no flow				clear60's
12/06/1999	1430		no flow				clear30's
01/11/2000	1110		no flow				cloudy40's
02/02/2000	1427		no flow				ptcloudy40's
03/06/2000	1355		no flow				cloudy30's
04/07/2000	1200		no flow				clear50's
05/26/2000	1115		no flow				clear70's
06/12/2000	1422		no flow				cloudy80's
07/06/2000	1205		no flow				clear80's
08/09/2000	1400		no flow				ptcloudy90's
09/13/2000	1045		no flow				clear80's
10/10/2000	1128		no flow				cloudy50's
11/06/2000	1127		no flow				cloudy30's
12/04/2000	1412		no flow				clear30's
01/03/2001	1126		no flow				clear40's
02/05/2001	1217		no flow				clear30's
03/08/2001	1400		no flow				clear40's
04/06/2001	1050		no flow				ptcloudy40's
05/11/2001	951		no flow				clear60's
06/06/2001	1142		no flow				clear60's
07/10/2001	1240		no flow				cloudy70's
08/14/2001	1142		no flow				clear70's
09/20/2001	1329		no flow				clear80's
10/16/2001	1130		no flow				clear60's
11/09/2001	1205		no flow				clear40's
12/12/2001	1049		no flow				clear20's
01/14/2002	1104		no flow				clear20's
02/05/2002	1220		no flow				clear30's

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## GRIMES WASH FLOW & QUALITY

### LEFT FORK - GWR02

<----- Field Measurements ----->							Weather
Date	Time	Temp. (°C)	Flow ft.	GPM	pH	Cond. (uS)	
12/10/1998	1125			Frozen			clear30's
01/05/1999	1122			15.2			clear30's
02/01/1999	1514			Frozen			clear30's
03/03/1999	1041			Frozen			cloudy50's
04/07/1999	1257			Dry			cloudy40's
05/05/1999	1426			Dry			ptcloudy50's
06/08/1999	1221	9.6		54.5	7.95	745	ptcloudy60's
07/23/1999	1123			40			sunny70's
08/03/1999	1430			40			cloudy60's
09/02/1999	1407	12.5		59	8.53	545	cloudy60's
10/04/1999	1442			45			clear70's
11/01/1999	1342			20			clear60's
12/06/1999	1440			Frozen			clear30's
01/11/2000	1119			Frozen			cloudy40's
02/02/2000	1433			Frozen			ptcloudy40's
03/06/2000	1400			Frozen			cloudy30's
04/07/2000	1212			Dry			clear50's
05/26/2000	1127			Damp			clear70's
06/12/2000	1426			Damp			cloudy80's
07/06/2000	1210			10			clear80's
08/09/2000	1403			8			ptcloudy90's
09/13/2000	1105	24.9		0.8	8.61	622	clear80's
10/10/2000	1135			10			cloudy50's
11/06/2000	1135			Frozen			cloudy30's
12/04/2000	1421			Frozen			clear30's
01/03/2001	1130			Frozen			clear40's
02/05/2001	1221			Frozen			clear30's
03/08/2001	1407			Dry			clear40's
04/06/2001	1101			5			ptcloudy40's
05/11/2001	1010			50			clear60's
06/06/2001	1153	10.5		192	8.47	789	clear60's
07/10/2001	1246			110			cloudy70's
08/14/2001	1159			67			clear80's
09/20/2001	1344	19.5		24	8.82	708	clear80's
10/16/2001	1138			21			clear60's
11/09/2001	1209			8			clear40's
12/12/2001	1049			Frozen			clear20's

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## GRIMES WASH FLOW & QUALITY

BELOW THE MINE - GWR03  
\*\* FLOW INCLUDES MINE DISCHARGE

← Field Measurements →								
Date	Time	Temp. (°C)	Flow		pH	Cond. (uS)	Weather	Comments
			ft.	GPM				
01/05/1999	1156			49.2			clear30's	
02/01/1999	1519			35			clear30's	
03/03/1999	1053	3.4		80	7.84	1537	cloudy50's	
04/07/1999	1305			53			cloudy40's	
05/05/1999	1433			74			ptcloudy50's	
06/08/1999	1245	9.9		80	8.21	1298	ptcloudy60's	
07/23/1999	1129			349			sunny70's	
08/03/1999	1436			367			cloudy60's	
09/02/1999	1426	11.4		112	8.32	1133	cloudy60's	
10/04/1999	1451			320			clear70's	
11/01/1999	1402			349			clear60's	
12/06/1999	1443	0.8		30	7.72	1511	clear30's	
01/11/2000	1123			45			cloudy40's	
02/02/2000	1443			42.8			ptcloudy40's	
03/06/2000	1410	1.4		40	8.01	9.2	cloudy30's	
04/07/2000	1215			60			clear50's	
05/26/2000	1132			305			clear70's	
06/12/2000	1433	16.2		21	8.17	1061	cloud80's	
07/06/2000	1220			309			clear80's	
08/09/2000	1409			310			ptcloudy90's	
09/13/2000	1126	12.6		20.4	8.51	1064	clear80's	
10/10/2000	1140			327			cloudy50's	rain
11/06/2000	1145			70			cloudy30's	
12/04/2000	1440	2.2		100	7.7	2350	clear30's	
01/03/2001	1141			25			clear40's	
02/05/2001	1227			30			clear30's	
03/08/2001	1440	7.7		87	8.57	2900	clear40's	
04/06/2001	1112			271			ptcloudy40's	
05/11/2001	1018			510			clear60's	
06/06/2001	1206	10.9		195	8.32	987	clear60's	
07/10/2001	1254			115			cloudy70's	
08/14/2001	1204			100			clear80's	
09/26/2001	1314	15.3		30	8.64	1450	clear80's	
10/16/2001	1158			25			clear60's	
11/09/2001	1218			9.8			clear40's	
12/12/2001	1110	4		6	7.53	1990	clear20's	

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**HUNTINGTON CREEK FLOW & QUALITY**

**HUNTINGTON CREEK - HCC01**

Date	Time	Temp. (oC)	Field Measurements				Weather	Comments
			Flow CFS	pH	Cond. (uS)	Dis. Oxygen		
12/02/1998	1037	0.2	34	7.32	428	8.4	clear40's	
03/03/1999	1419	3.5	26	7.77	419	6.4	cloudy50's	
06/17/1999	1425	11.3	427	7.83	266	6.2	ptcloudy70's	
09/14/1999	840	6.3	116	7.97	280	6.3	cloudy60's	
12/09/1999	1335	-1.2	20	8.34	452	9.4	cloudy20's	
03/09/2000	1509	2.7	29	8.16	445	9.7	ptcloudy30's	
06/26/2000	1405	10.7	125	8.3	279	9.1	cloudy70's	
09/25/2000	1237	7.2	121	8.77	275	9.6	clear80's	
12/05/2000	1158	0	14	7.95	463	11.9	clear30's	
03/13/2001	1422	5.3	21	8.78	486	12.2	clear40's	
06/26/2001	1452	11	99	8.35	369	*	cloudy70's, rain	*DO Probe Not Functioning
09/12/2001	1430	9.6	105	8.32	343	11.1	ptcloudy70's	
12/12/2001	1454	1.3	19	7.41	463	13.6	clear20's	

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**HUNTINGTON CREEK FLOW & QUALITY**

**HUNTINGTON CREEK - HCC02**

Date	Time	Temp. (oC)	Field Measurements		Cond. (uS)	Dis. Oxygen	Weather	Comments
			Flow CFS	pH				
12/02/1998	1051	0.8	34	7.69	438	7.9	clear40's	
03/03/1999	1432	3.9	26	7.85	453	6.4	cloudy50's	
06/17/1999	1442	11.1	427	8.02	268	7.2	ptcloudy70's	
09/14/1999	850	6	116	8.01	287	6.2	cloudy60's	
12/09/1999	1348	-0.1	20	7.99	534	10.9	cloudy20's	
03/09/2000	1520	3	29	8.28	523	9.5	ptcloudy30's	
06/26/2000	1415	10.7	125	8.41	293	7.4	cloudy70's	
09/25/2000	1248	7	121	8.79	281	9.7	clear80's	
12/05/2000	1209	0.9	14	7.87	570	11.9	clear30's	
03/13/2001	1432	5.6	21	8.69	547	12.1	clear40's	
06/26/2001	1505	11.2	99	8	381	*	cloudy70's, rain	*DO Probe Not Functioning
09/12/2001	1443	9.5	105	8.5	351	11	ptcloudy70's	
12/12/2001	1504	0.9	19	7.69	541	14.2	clear20's	

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## HUNTINGTON CREEK FLOW & QUALITY

### HUNTINGTON CREEK - HCC04

Date	Time	Temp. (oC)	Field Measurements		Cond. (uS)	Dis. Oxygen	Weather	Comments
			Flow CFS	pH				
12/02/1998	1105	1.3	34	8.01	515	7.9	clear40;s	
03/03/1999	1451	4.6	26	8.21	506	6	cloudy50's	
06/17/1999	1455	11.1	427	8.16	272	6.1	ptcloudy70's	
09/14/1999	900	6.1	116	8.13	294	6	cloudy60's	
12/09/1999	1401	-1.3	20	8.48	624	9.6	cloudy20's	
03/10/2000	1100	2.3	29	7.81	537	10	ptcloudy30's	
06/26/2000	1430	11	125	8.49	312	7.2	cloudy70's	
09/25/2000	1303	7	121	8.73	294	9.7	clear80's	
12/05/2000	1225	1.2	14	8.17	638	10.5	clear30's	
03/13/2001	1446	6.5	21	8.72	600	11.8	clear40's	
06/26/2001	1522	11.4	99	8.61	401	*	cloudy70's, rain	*DO Probe Not Functioning
09/17/2001	1213	7.7	105	8.56	372	*	cloudy70's	*DO Probe Not Functioning
12/13/2001	1052	1.9	19	8	641	11.5	clear20's	

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## MEETINGHOUSE CANYON MHC01

Date	Time	Field Measurements				Cond. (uS)	Weather	Comments
		Temp. (oC)	Flow ft.	GPM	pH			
01/12/1999	1137			Frozen				
02/02/1999	1339			Frozen			clear30's	
03/03/1999	1403			Frozen			cloudy30's	
04/12/1999	1453			Dry			cloudy50's	
05/10/1999	1402			339			ptcloudy50's	
06/17/1999	1400	11.8		1336	7.63	349	ptcloudy50's	
07/26/1999	1213			365			ptcloudy70's	
08/12/1999	1203			365			cloudy80's	
09/13/1999	1348	12.3		145	7.74	372	ptcloudy70's	
10/05/1999	1446			117			clear70's	
11/17/1999	1436			Frozen			clear70's	
12/08/1999	1352			Frozen			ptcloudy50's	
01/17/2000	1031			Frozen			clear30's	
02/03/2000	1334			Frozen			ptcloudy40's	
03/09/2000	1423			Frozen			clear40's	
04/05/2000	1340			Frozen			ptcloudy30's	
05/03/2000	1150			Frozen			ptcloudy50's	
06/26/2000	1125	13.4		463			clear60's	
07/06/2000	1503			350	8.24	350	cloudy70's	
08/09/2000	901			117			clear80's	
09/11/2000	1410	15		41			ptcloudy90's	
10/10/2000	1531			35	8.76	368	clear80's	
11/28/2000	1320			117			cloudy50's	rain and snow.
12/05/2000	1100			Frozen			cloudy40's	
01/05/2001	1244			Frozen			clear30's	
02/05/2001	1415			Frozen			clear40's	
03/13/2001	1336			INACCESSIBLE SNOW			ptcloudy40's	
04/23/2001	1152			INACCESSIBLE SNOW			clear40's	
05/14/2001	1310			Dry			clear40's	
06/26/2001	1428	10.1		3700 est.			clear60's	over capacity
07/03/2001	1012			647	8.59	448	cloudy70's	rain
08/07/2001	1500			448			clear80's	
09/12/2001	1144	9.9		175			cloudy80's	
10/17/2001	1149			68	7.33	435	ptcloudy70's	
11/08/2001	1037			47			cloudy60's	
12/12/2001	1435			41			clear40's	
				Frozen			clear20's	



# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## MILL FORK CANYON FLOW & QUALITY

### MILL FORK CANYON ABOVE MINE (MFA1)

Date	Time	Field Measurements						Weather	Comments
		Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)	Dis. Oxygen		
01/12/1999	1057			Dry				clear30's	
02/02/1999	1151			Dry				cloudy30's	
03/03/1999	1129			Dry				cloudy50's	
04/12/1999	1339			Dry				ptcloudy50's	
05/10/1999	1016			Dry				cloudy40's	
06/11/1999	958	3		1500	7.80	383	6.2	clear70's	
07/26/1999	829			150				cloudy80's	
08/12/1999	947			100				ptcloudy70's	
09/13/1999	1200			Dry				clear70's	
10/05/1999	954			Dry				clear70's	
11/17/1999	1416			Dry				clear70's	
12/08/1999	1300			Dry				clear30's	
01/12/2000	1323			Dry				clear40's	
02/03/2000	1000			INACCESSIBLE SNOW				clear40's	
03/09/2000	1338			INACCESSIBLE SNOW				ptcloudy30's	
04/05/2000	1301			INACCESSIBLE SNOW				ptcloudy50's	
05/03/2000	1033			INACCESSIBLE SNOW				clear60's	
06/22/2000	1354			Dry				cloudy80's	
07/06/2000	1424			Dry				clear80's	
08/07/2000	1300			Dry				ptcloudy80's	
09/11/2000	1335			Dry				clear80's	
10/10/2000	1320			Dry				cloudy50's	
11/06/2000	1450			Dry				cloudy30's	
12/05/2000	855			Dry				clear30's	
01/05/2001	1053			Dry				clear40's	
02/05/2001	1350			INACCESSIBLE SNOW				ptcloudy40's	
03/13/2001	1300			Dry				clear40's	
04/20/2001	1018			Dry				ptcloudy40's	
05/09/2001	1431			Dry				clear60's	
06/26/2001	1321			Dry				cloudy70's	rain
07/03/2001	831			Dry				clear80's	
08/07/2001	1255			Dry				cloudy80's	
09/12/2001	900			Dry				ptcloudy70's	
10/17/2001	930			Dry				cloudy50's	
11/08/2001	855			Dry				clear40's	
12/12/2001	1425			Dry				clear20's	

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### MILL FORK CANYON FLOW & QUALITY

#### MILL FORK CANYON BELOW MINE (MFB2)

Date	Time	Field Measurements					Dis. Oxygen	Weather	Comments
		Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)			
01/12/1999	1104			Frozen				clear30's	
02/02/1999	1157			Frozen				cloudy30's	
03/03/1999	1137			Frozen				cloudy50's	
04/12/1999	1353			Frozen				ptcloudy50's	
05/10/1999	1045			27				cloudy40's	
06/11/1999	1023	4		1600	7.92	413	7.1	clear70's	
07/26/1999	844			200				cloudy80's	
08/12/1999	1000			160				ptcloudy70's	
09/13/1999	1305	10		67	7.87	536	6.1	clear70's	
10/05/1999	1006			75				clear70's	
11/17/1999	1421			33				ptcloudy50's	
12/08/1999	1312			Frozen				clear30's	
01/12/2000	1333			Frozen				clear40's	
02/03/2000	1012			Frozen				clear40's	
03/09/2000	1346			INACCESSIBLE SNOW				ptcloudy30's	
04/05/2000	1308			Frozen				ptcloudy50's	
05/03/2000	1042			Dry				clear60's	
06/22/2000	1400			Dry				cloudy80's	
07/06/2000	1442			Dry				clear80's	
08/07/2000	1310			Dry				ptcloudy80's	
09/11/2000	1345			Dry				clear80's	
10/10/2000	1325			Dry				clear50's	
11/06/2000	1440			Frozen				cloudy30's	
12/05/2000	905			Frozen				clear30's	
01/05/2001	1100			Frozen				clear40's	
02/05/2001	1352			Frozen				ptcloudy40's	
03/13/2001	1310			Frozen				clear40's	
04/20/2001	1024			Dry				ptcloudy40's	
05/09/2001	1444			Dry				clear60's	
06/26/2001	1339	8		136	8.61	667		cloudy70's	rain
07/03/2001	843			90				clear80's	
08/07/2001	1324			18.6				cloudy80's	
09/12/2001	915	7		2.2	8.54	693	11.6	ptcloudy70's	
10/17/2001	945			Dry				cloudy50's	
11/08/2001	910			Dry				clear40's	
12/12/2001	1425			Dry				clear20's	

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## RILDA CANYON FLOW & QUALITY

### RILDA CANYON - FLUME #1(RCF1)

← Field Measurements →							
Date	Time	Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)	Weather
04-17-89	1120		DRY				PC 60's
01/12/1999	915			Frozen			ptcloudy30's
02/02/1999	1200			INACCESSIBLE SNOW			cloudy30's
03/03/1999	1153			INACCESSIBLE SNOW			cloudy50's
04/12/1999	1355			INACCESSIBLE SNOW			ptcloudy50's
05/11/1999	1330			499			clear50's
06/11/1999	1200	8.3		1303	8.01	382	clear70's
07/26/1999	1010			296			cloudy80's
08/12/1999	1045			252			ptcloudy70's
09/16/1999	1334	8.5		101	7.85	372	cloudy70's
10/05/1999	1049			78			clear70's
11/17/1999	1254			Frozen			ptcloudy50's
12/09/1999	951			Frozen			cloudy20's
01/12/2000	1338			INACCESSIBLE SNOW			clear40's
02/03/2000	1040			INACCESSIBLE SNOW			clear40's
03/09/2000	1410			INACCESSIBLE SNOW			ptcloudy30's
04/05/2000	1317			INACCESSIBLE SNOW			ptcloudy50's
05/05/2000	1030			902			clear70's
06/23/2000	1008	10.4		296	8.16	369	cloudy80's
07/06/2000	1350			90			clear80's
08/07/2000	1354			15			ptcloudy80's
09/13/2000	1325			Damp			clear80's
10/10/2000	1354			10			cloudy50's
11/28/2000	1330			INACCESSIBLE SNOW			cloudy40's
12/05/2000	910			INACCESSIBLE SNOW			clear30's
01/05/2001	1155			INACCESSIBLE SNOW			clear40's
02/05/2001	1400			INACCESSIBLE SNOW			ptcloudy40's
03/13/2001	1315			INACCESSIBLE SNOW			clear40's
04/20/2001	1036			INACCESSIBLE SNOW			ptcloudy40's
05/14/2001	1115			2842			clear60's
06/05/2001	1126	5.7		1712	8.74	458	clear60's
07/11/2001	915			274			clear80's
08/07/2001	1350			60			cloudy80's
09/12/2001	1004	8.4		36	8.17	435	ptcloudy70's
10/17/2001	1007			71.5			cloudy50's
11/27/2001	900			INACCESSIBLE SNOW			clear20's
12/12/2001	1320			INACCESSIBLE SNOW			

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**RILDA CANYON FLOW & QUALITY**

**RILDA CANYON - LEFT FORK (RCLF1)**

Date	Time	Field Measurements				Cond. (uS)	Weather
		Temp. (oC)	Flow ft.	GPM	pH		
01/12/1999	952			Dry			ptcloudy30's
02/02/1999	1204			INACCESSIBLE SNOW			cloudy30's
03/03/1999	1153			INACCESSIBLE SNOW			cloudy50's
04/12/1999	1400			Dry			ptcloudy50's
05/10/1999	1127			38			cloudy40's
06/11/1999	1305	7.3		165	7.99	534	clear70's
07/26/1999	910			12			cloudy80's
08/12/1999	1124			11			ptcloudy70's
09/16/1999	1400			Dry			cloudy70's
10/05/1999	1119			Dry			clear70's
11/17/1999	1319			Dry			ptcloudy50's
12/08/1999	1320			Dry			clear30's
01/12/2000	1345			INACCESSIBLE SNOW			clear40's
02/03/2000	1047			INACCESSIBLE SNOW			clear40's
03/09/2000	1410			INACCESSIBLE SNOW			ptcloudy30's
04/05/2000	1317			INACCESSIBLE SNOW			ptcloudy50's
05/03/2000	1059			27			clear60's
06/23/2000	1114	10		5.7	8.43	519	cloudy80's
07/06/2000	1416			Dry			clear80's
08/07/2000	1321			Dry			ptcloudy80's
09/13/2000	1352			Dry			clear80's
10/10/2000	1331			Dry			cloudy50's
11/28/2000	1337			Dry			cloudy40's
12/05/2000	914			Dry			clear30's
01/05/2001	1121			Dry			clear40's
02/05/2001	1400			INACCESSIBLE SNOW			ptcloudy40's
03/13/2001	1315			INACCESSIBLE SNOW			clear40's
04/20/2001	1034			Dry			ptcloudy40's
05/14/2001	1235			100			clear60's
06/29/2001	821	7.9		13.6	8.62	567	clear80's
07/03/2001	904			5			clear80's
08/07/2001	1415			Dry			cloudy80's
09/12/2001	1040			Dry			ptcloudy70's
10/17/2001	945			Dry			cloudy50's
11/08/2001	953			Dry			clear40's
12/12/2001	1320			INACCESSIBLE SNOW			clear20's

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**RILDA CANYON FLOW & QUALITY**

**RILDA CANYON - LEFT FORK (RCLF2)**

← Field Measurements →							Weather	Comments
Date	Time	Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)		
01/12/1999	942			Frozen			ptcloudy30's	
02/02/1999	1212			INACCESSIBLE SNOW			cloudy30's	
03/03/1999	1153			INACCESSIBLE SNOW			cloudy50's	
04/12/1999	1409			Dry			ptcloudy50's	
05/10/1999	1118			37.5			cloudy40's	
06/11/1999	1300	8		160	7.95	539	clear70's	
07/26/1999	942			10			cloudy80's	
08/12/1999	1132			9.2			ptcloudy70's	
09/16/1999	1416			Dry			cloudy70's	
10/05/1999	1123			Dry			clear70's	
11/17/1999	1324			Dry			ptcloudy50's	
12/08/1999	1325			Dry			clear30's	
01/12/2000	1350			INACCESSIBLE SNOW			clear40's	
02/03/2000	1050			INACCESSIBLE SNOW			clear40's	
03/09/2000	1410			INACCESSIBLE SNOW			ptcloudy30's	
04/05/2000	1317			INACCESSIBLE SNOW			ptcloudy50's	
05/03/2000	1052			25			clear60's	
06/23/2000	1105	9.1		7.5	8.38	533	cloudy80's	
07/06/2000	1410			Dry			clear80's	
08/07/2000	1325			Dry			ptcloudy80's	
09/13/2000	1357			Dry			clear80's	
10/10/2000	1340			Dry			cloudy50's	
11/28/2000	1341			Dry			cloudy40's	
12/05/2000	915			Dry			clear30's	
01/05/2001	1124			Dry			clear40's	
02/05/2001	1400			INACCESSIBLE SNOW			ptcloudy40's	
03/13/2001	1315			INACCESSIBLE SNOW			clear40's	
04/20/2001	1030			Dry			ptcloudy40's	
05/14/2001	1220			104			clear60's	
06/29/2001	806	7.9		14.6	8.25	539	clear80's	
07/03/2001	856			8			clear80's	
08/07/2001	1420			Dry			cloudy80's	
09/12/2001	1045			Dry			ptcloudy70's	
10/17/2001	948			Dry			cloudy50's	
11/08/2001	1000			Dry			clear40's	
12/12/2001	1320			INACCESSIBLE SNOW			clear20's	

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### RILDA CANYON FLOW & QUALITY

### RILDA CANYON - FLUME #2 (RCF2)

← Field Measurements →							
Date	Time	Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)	Weather
01/12/1999	1003			Frozen			ptcloudy30's
02/02/1999	1230			Frozen			cloudy30's
03/03/1999	1220			Frozen			cloudy50's
04/12/1999	1418			Dry			ptcloudy50's
05/10/1999	1133			608			cloudy40's
06/15/1999	1355	9.5		3474	7.9	388	cloudy70's
07/26/1999	1043			339			cloudy80's
08/12/1999	1138			300			ptcloudy70's
09/16/1999	1430			55.36			cloudy70's
10/05/1999	1140			36			clear70's
11/17/1999	1335			Dry			ptcloudy50's
12/08/1999	1330			Dry			clear30's
01/12/2000	1356			Dry			clear40's
02/03/2000	1053			Dry			clear40's
03/09/2000	1410			INACCESSIBLE SNOW			ptcloudy30's
04/05/2000	1317			INACCESSIBLE SNOW			ptcloudy50's
05/03/2000	1113			927			clear60's
06/23/2000	1126	8		227	8.21	379	cloudy80's
07/06/2000	1430			35.5			clear80's
08/07/2000	1443			Dry			ptcloudy80's
09/13/2000	1405			Dry			clear80's
10/10/2000	1437			Dry			cloudy50's
11/28/2000	1345			Dry			cloudy40's
12/05/2000	918			Dry			clear30's
01/05/2001	1130			Dry			clear40's
02/05/2001	1400			INACCESSIBLE SNOW			ptcloudy40's
03/13/2001	1315			INACCESSIBLE SNOW			clear40's
04/20/2001	1054			Dry			ptcloudy40's
05/14/2001	1241			2529			clear60's
06/29/2001	857	7.7		209	8.52	449	clear80's
07/03/2001	922			103			clear80's
08/07/2001	1433			78			cloudy80's
09/12/2001	1055			Dry			ptcloudy70's
10/17/2001	1050			Dry			cloudy50's
11/08/2001	1004			Dry			clear40's
12/12/2001	1346			Dry			clear20's

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

## RILDA CANYON FLOW & QUALITY

### RILDA CANYON - FLUME #3 (RCF3)

Date	Time	Temp. (oC)	Field Measurements				Dis. Oxygen	Weather	Comments
			Flow ft.	GPM	pH	Cond. (uS)			
01/12/1999	1013			176					clear30's
02/02/1999	1240			161					cloudy30's
03/03/1999	1242	4.5		176	7.72	732	5.8		cloudy50's
04/12/1999	1424			161					ptcloudy50's
05/10/1999	1136			709					cloudy40's
06/15/1999	1424	9.3		3500	8.05	391	6.9		cloudy70's
07/26/1999	1047			380					cloudy80's
08/12/1999	1142			339					ptcloudy70's
09/16/1999	1439	8.9		120	7.5	572	6.1		cloudy70's
10/05/1999	1147			120					clear70's
11/17/1999	1346			95					ptcloudy50's
12/09/1999	1108	2.1		90	7.6	747	10.7		cloudy20's
01/12/2000	1400			70					clear40's
02/03/2000	1056			65					clear40's
03/09/2000	1410			INACCESSIBLE SNOW					ptcloudy30's
04/05/2000	1317			INACCESSIBLE SNOW					ptcloudy50's
05/03/2000	1124			1134					clear60's
06/22/1999	1446	9.5		262	7.87	487	8.4		cloudy80's
07/06/2000	1436			103					clear80's
08/07/2000	1507			103					ptcloudy80's
09/13/2000	1419	10.5		78	8.24	735	7.5		clear80's
10/10/2000	1445			90					cloudy50's
11/28/2000	1403			100					cloudy40's
12/05/2000	950	2.7		103	7.91	902	10.5		clear30's
01/05/2001	1155			90					clear40's
02/05/2001	1400			INACCESSIBLE SNOW					ptcloudy40's
03/13/2001	1315			INACCESSIBLE SNOW					clear40's
04/20/2001	1057			103					ptcloudy40's
05/14/2001	1244			3118					clear60's
06/29/2001	908	7.6		339	8.29	530			clear80's
07/03/2001	926			227					clear80's
08/07/2001	1439			103					cloudy80's
09/12/2001	1108	7.9		64	7.39	867	11		ptcloudy70's
10/17/2001	1100			75					cloudy50's
11/08/2001	1010			77					clear40's
12/12/2001	1353	4		48	8	825	9		clear20's

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**RILDA CANYON FLOW & QUALITY**

**RILDA CANYON - WEIR #4 (RCW4)**

← Field Measurements →								Weather	Comments
Date	Time	Temp. (oC)	Flow ft.	GPM	pH	Cond. (uS)	Dis. Oxygen		
01/12/1999	1046			Frozen				clear30's	
02/02/1999	1319			157				cloudy30's	
03/03/1999	1340	3		157	8.07	698	6	cloudy50's	
04/12/1999	1435			125.1				ptcloudy50's	
05/10/1999	1142			840				cloudy40's	
06/15/1999	1540	8.8		3550	8.21	411	6.8	cloudy70's	
07/26/1999	1128			551				cloudy80's	
08/12/1999	1148			464.8				ptcloudy70's	
09/16/1999	1522	7.9		183.9	8.25	648	5.6	cloudy70's	
10/05/1999	1323			157				clear70's	
11/17/1999	1410			174.7				ptcloudy50's	
12/08/1999	1339			Frozen				clear30's	
01/12/2000	1415			175				clear40's	
02/03/2000	1126			175				clear40's	
03/09/2000	1407	2.8		157	7.54	717	9.8	ptcloudy30's	
04/05/2000	1314			183.9				ptcloudy50's	
05/03/2000	1136			1207				clear60's	
06/22/2000	1544	10.4		417	8.17	556	8.9	cloudy80's	
07/06/2000	1516			157				clear80's	
08/07/2000	1519			157				ptcloudy80's	
09/13/2000	1525	11		125	8.6	720	8.7	clear80's	
10/10/2000	1516			157				cloudy50's	rain -snow
11/28/2000	1421			157				cloudy40's	
12/05/2000	1039	-0.5		157	7.83	908	14	clear30's	
01/05/2001	1228			157				clear40's	
02/05/2001	1405			174				ptcloudy40's	
03/13/2001	1320	5.4		175	8.67	845	11.3	clear40's	
04/20/2001	1106			203				ptcloudy40's	
05/14/2001	1251			3117				clear60's	
06/29/2001	958	7.9		448	8.25	660	*	clear80's	*DO Probe Not Functioning
07/11/2001	945			331				clear80's	
08/07/2001	1446			203				cloudy80's	
09/12/2001	1118	9.2		117	7.94	889	10.9	ptcloudy70's	
10/17/2001	1128			132				cloudy60's	
11/08/2001	1016			124				clear40's	
12/12/2001	1416	0.7		140.5	8.23	867	11.8	clear20's	



# EAST MOUNTAIN

## SPRING DISCHARGE RECESSION STUDY

### YEAR 2001

SPRING		JUL	AUG	SEP	OCT
<b>79-10</b>	Flow (GPM)	10.3	5.7	5.1	3.2
	Temp. (C)	5.2	5.4	5.6	3.3
<b>SHEBA SPRINGS</b>	Flow (GPM)	2.9	2.2	1.7	1.0
	Temp. (C)	6.0	6.7	7.4	5.1
<b>ELK SPRING</b>	Flow (GPM)	131.0	85.0	73.0	67.0
	Temp. (C)	4.0	3.9	4.0	3.5
<b>79-35</b>	Flow (GPM)	4.5	2.5	2.0	1.6
	Temp. (C)	4.6	5.3	4.9	5.5
<b>79-26</b>	Flow (GPM)	4.3	2.4	2.0	1.6
	Temp. (C)	7.7	5.2	5.0	5.5
<b>79-29</b>	Flow (GPM)	1.5	1.4	1.4	1.0
	Temp. (C)	4.4	4.6	5.2	3.4
<b>84-56</b>	Flow (GPM)	0.8	0.5	0.5	0.4
	Temp. (C)	5.5	5.6	5.9	3.6
<b>80-44</b>	Flow (GPM)	est. < 0.5 gpm	est.<0.5gpm	<0.5gpm	<0.5gpm
	Temp. (C)				
<b>80-46</b>	Flow (GPM)	2.1	2.3	1.0	Damp
	Temp. (C)	4.6	6.3	6.2	
<b>BURNT TREE</b>	Flow (GPM)	5.6	5.3	10.0	6.0
	Temp. (C)	5.4	6.6	7.0	5.6
<b>79-23</b>	Flow (GPM)	dry	dry	dry	dry
	Temp. (C)				
<b>82-52</b>	Flow (GPM)	8.0	6.2	5.8	4.1
	Temp. (C)	4.1	4.5	4.2	4.3

# EAST MOUNTAIN SPRINGS DISCHARGE

## 2001

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
Sheba	07/25/2001	2.9	6.0	10/09/2001	1.0	5.1	-65.52
Elk Spring	07/25/2001	131.0	4.0	10/08/2001	67.0	3.5	-48.85
Burnt Tree	07/26/2001	5.6	5.4	10/04/2001	6.0	5.6	7.14
Jerk Water							
Pine Springs							
Pine Sp. Trough							
Ted's Tub	07/26/2001	24.0	5.7	10/09/2001	6.6	3.3	-72.50
79-1							
79-2	07/26/2001	1.9	4.6	10/04/2001	1.2	4.8	-36.84
79-3							
79-4							
79-5							
79-6							
79-7							
79-8							
79-9							
79-10	07/25/2001	10.3	5.2	10/09/2001	3.2	3.3	-68.93
79-11							
79-12	07/27/200	0.5	est., sheet flow	10/09/2001		damp	
79-13							
79-14							
79-15	07/26/2001	10.5	5.0	10/10/2001	3.9	2.9	-62.86
79-16							
79-17							
79-18							
79-19							
79-20							
79-21							
79-22							
79-23	07/26/2001		dry	10/04/2001	dry		
79-24	07/26/2001		dry	10/04/2001	dry		
79-25							
79-26	07/25/2001	4.3	7.7	10/08/2001	1.6	5.5	-62.79
79-27							
79-28	07/25/2001	1.2	5.9	10/09/2001	0.4	4.8	-65.83
79-29	07/25/2001	1.5	4.4	10/08/2001	1.0	3.4	-33.33
79-30							
79-31							
79-32	07/25/2001	0.6	10.4	10/08/2001	0.4	5.8	-35.48
79-33							
79-34	07/26/2001	8.4	4.8	10/09/2001	0.3	4.4	
79-35	07/25/2001	4.5	4.6	10/08/2001	1.6	5.5	-64.44
79-36							
79-37							
79-38	07/27/2001	3.3	5.1	10/09/2001	1.4	4.8	-57.58
79-39							
79-40	07/26/2001	1.3	4.5	10/09/2001		dry	
80-41	07/26/2001	4.8	3.1	10/09/2001	0.5	3.0	-90.00

# EAST MOUNTAIN SPRINGS DISCHARGE

## 2001

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
80-42							
80-43	07/26/2001		DAMP	10/04/2001		dry	
80-44	07/26/2001	0.5	est., sheet flow	10/09/2001	0.5	est., sheet flow	
80-45							
80-46	07/26/2001	2.1	4.6	10/04/2001		damp	
80-47	07/26/2001	9.4	4.0	10/04/2001	6.8	4.5	-27.66
80-48	07/25/2001	3.8	6.4	10/08/2001	1.6	6.9	-57.89
80-49							
80-50	07/30/2001	0.8	7.4	10/11/2001	0.4	6.3	-52.50
82-51	07/26/2001	1.3	8.7	10/04/2001	0.1		-92.31
82-52	07/26/2001	8.0	4.1	10/04/2001	4.1	4.3	-48.75
84-53							
84-54							
84-55							
84-56	07/26/2001	0.8	5.5	10/09/2001	0.4	3.6	-48.68
85-57							
86-58							
86-59							
89-60	07/27/2001	7.6	7.6	10/09/2001	1.0	3.2	-86.84
89-61	07/25/2001	47.0	4.1	10/08/2001	20.0	3.7	-57.45
89-62							
89-63							
89-64							
89-65	07/25/2001	1.2	6.0	10/08/2001	0.7	6.3	-45.00
89-66	07/25/2001	1.0	6.4	10/08/2001	<0.05		
89-67	07/25/2001	4.9	4.1	10/08/2001	2.8	4.3	-42.86
89-68	07/25/2001	1.0	8.3	10/08/2001	0.5	8.1	-51.00
89-69							
89-70							
89-71							
91-72	07/27/2001	8.2	8.5	10/10/2001	8.3	8.5	1.22
91-73	07/27/2001	0.9	8.8	10/10/2001	0.51	6.7	-44.57

TOTAL FLOW FOR JULY  
(W/OUT 80-50, 91-72 & 73)

305.2

134.9

Net Change - Average

-52.30

Net Change - By Volume

-55.79

TOTAL FOR JULY 2000 = 205.4 GPM

JULY 2001 48 % HIGHER THAN JULY 2000

**TRAIL MOUNTAIN**  
**SPRING DISCHARGE RECESSION STUDY**  
**YEAR 2001**

SPRING		JUL	AUG	SEP	OCT	Seasonal Net Change %
T-6	Flow (GPM)	4.8	2.2	1.7	1.0	-79.2
18-2-1	Temp. (C)	10	9	8	7	
T-8	Flow (GPM)	0.4	0.3	0.3	0.3	-31.6
17-21-1	Temp. (C)	13	10	10	6	
T-9	Flow (GPM)	6.0	3.3	3.0	1.5	-75.0
17-22-1	Temp. (C)	8	6	6	6	
T-10	Flow (GPM)	0.2	0.2	0.2		
17-26-4	Temp. (C)	15	7	7	0.0	
T-14	Flow (GPM)	0.5	0.5	0.5		
17-25-1	Temp. (C)	16	9	9	0.0	
T-14A	Flow (GPM)	0.0	0.0	0.0	0.0	
17-26-5	Temp. (C)					
T-15	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-1	Temp. (C)					
T-16	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-2	Temp. (C)					
TM-23*	Flow (GPM)	0.0	0.0	0.0	0.0	
	Temp. (C)					

**JULY TOTAL 11.9**

**OCTOBER TOTAL 2.76**

**TOTAL FOR JULY 2001 = 11.9**

**Net Change - Average -61.92**

**JULY 2001 74% LOWER THAN JULY 2000**

**Net Change - By Volume -76.77**

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

DEER CREEK MINE / DISCHARGE

PERMIT # 0023604-002

(DCD)

Quality

Date	Time	GPM	Temp. (°C)	Comments	Quantity	
					Month	Gallons/day
08/05/1999	1545	2598	12		November	2,105,088
09/07/1999	1625	8984	11		December	1,635,004
10/07/1999	1050	1836	9		January	820,252
10/20/1999	1457	1074	13		February	909,991
11/09/1999	1345	1230	10		March	1,091,390
12/08/1999	1500	1523	8		April	1,268,208
01/11/2000	1430	600	10		May	2,164,952
01/25/2000	1431	750	12		June	3,361,872
02/10/2000	1440	1484	8		July	2,941,692
03/07/2000	1329	600	12		August	2,808,274
04/03/2000	1350	800	12		September	2,550,163
04/25/2000	1328	600	13		October	2,417,583
05/08/2000	1210	1500	11		November	1,982,105
06/08/2000	1200	2480	11		December	1,899,253
07/20/2000	1430	2324	11		January	1,784,044
08/07/2000	910	2070	11		February	1,784,044
09/07/2000	1005	1758	11		March	1,784,044
09/20/2000	1000	1738	14		April	1,765,354
10/16/2000	1030	1699	10		May	2,432,801
11/06/2000	1020	1602	8		June	2,602,987
11/08/2000	1029	1543	12		July	2,800,215
12/14/2000	1440	1000	9		August	2,803,090
01/09/2001	1025	1445.3	9		September	2,618,261
02/05/2001	1500	1000	8		October	2,459,562
02/27/2001	1310	1000	11		November	2,354,218
03/20/2001	1150	53.9	4		December	2,272,320
04/13/2001	1200	1000	10			
04/25/2001	937	1601	12			
05/08/2001	1425	1816	12			
06/18/2001	1425	2109	15			
07/26/2001	1440	1973	13			
08/22/2001	831	1953	13			
09/18/2001	1400	1875	13			
10/23/2001	945	1836	13			
11/13/2001	1600	1315	13			
12/13/2001	1528	1500	13			

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**OLIPHANT MINE - STRAIGHT CANYON**

(T-18)

Quality

Date	Time	GPM	Temp. (°C)	pH	Cond. (uS)	Oxygen	Quantity Dis. Gallons/day	Comments
03/20/1998	1215	Dry						
06/11/1998	1115	0.5						
09/03/1998	1331	0.6	no sample sheet flow					
10/02/1998	1312	0.51	12	7.39	615	5.9	864	
11/03/1998	1146	0.51						
12/09/1998	1410	0.52	3	6.94	575	8.3	749	
03/01/1999	1022	0.5	7	7.41	554	5.7	720	
06/08/1999	1016	0.5	9	7.32	555	7.2	720	
09/02/1999	1252	0.5	10	7.4	568	5.7	720	
12/06/1999	1249	0.43	5	7.35	569	9.8	619	
03/08/2000	933	0.5	6	7.58	549	8.3	720	
06/15/2000	1115	0.5	11	7.27	574	6.8	720	
09/12/2000	1515	0.4	11	7.76	564	7.1	576	
12/04/2000	1005	0.37	5	7.24	629	9.5	533	
03/08/2001	1055	0.37	7	8.05	618	2.3	533	
06/06/2001	1025	0.36	10	7.39	669	*	518	*DO Probe Not Functioning
09/26/2001	1121	0.17	12	7.75	657	*	245	
12/10/2001	1218	0.1						no sample taken

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

TRAIL MOUNTAIN MINE - COTTONWOOD CANYON  
 PERMIT # UTG040003-002  
 (TRAIL MOUNTAIN MINE DISCHARGE to COTTONWOOD CANYON CREEK)

Date	Time	Quality		Comments	Month	Quantity Gallons/day
		GPM	Temp. (°C)			
01/08/1999	930	140	10.8		June	465,758
01/19/1999	1115	180	12.2		July	513,331
02/09/1999	1455	70	13.8		August	350,706
02/16/1999	1555	650	11		September	317,830
03/08/1999	1320	210	11.5		October	316,648
03/25/1999	1020	12	13.3		November	297,238
04/11/1999	1345	220	11.9		December	372,089
04/13/1999	1050	220	12.5		January	339,338
05/10/1999	1045	160	11.1		February	407,056
05/24/1999	1130	180	14.8		March	631,894
06/15/1999	1540	600	15.2		April	257,678
06/25/1999	835	300	15		May	535,483
07/07/1999	1410	600	15.7		June	553,183
08/05/1999	1715	160	18.6		July	584,539
09/07/1999	1110	480	14.3		August	423,537
09/17/1999	1125	140	14.6		September	611,888
10/07/1999	1515	360	13.1		October	447,786
10/20/1999	1355	100	15.3		November	450,322
11/09/1999	1455	350	12.8		December	196,457
12/08/1999	940	400	10.6		January	60,728
01/12/2000	915	100	11.8		February	70,293
01/17/2000	1420	200	11.4		March	207,409
02/10/2000	1205	600	10.8		April	138,150
02/16/2000	830	600	10.8		May	29
03/07/2000	1509	220	12.7		June	0
03/17/2000	1005	240	10.7		July	0
04/10/2000	1155	280	11.8		August	0
04/25/2000	1457	150	15.8		September	0
05/08/2000	1505	180	13.2		October	0
05/23/2000	1025	200	14.5		November	0
06/08/2000	1505	400	14.6		December	0
06/13/2000	930	400	14.6			
07/20/2000	1205	650	14.6			
07/25/2000	1330	480	14.5			
08/07/2000	155	200	16.6			
08/14/2000	1135	200	16.5			
09/15/2000	1415	150	16.8			
09/20/2000	1215	400	17.9			
10/16/2000	1530	400	13.7			
10/23/2000	1320	400	14			
11/06/2000	1150	460	11.6			
12/14/2000	1540	300	9.1			
12/19/2000	1505	280	8.6			
02/22/2001	1040	400	10.7			
02/26/2001	1005	520	7.9			
03/20/2001	1415	300	11.6			
04/04/2001	1045	360	8.7			
04/17/2001	850	500	8.3			
05/08/2001	940	340	10.4			

June-Dec-01 NO DISCHARGE MINE SEALED

# PACIFICORP TECHNICAL SERVICES - HYDROLOGIC MONITORING

WILBERG MINE - GRIMES WASH

PERMIT # 0022896-001A

(WMD01)

TMA Discharge to Cottonwood Canyon Creek

UPDES 001 Transferred to TMA - June 2001

Quality		Temp.		Quantity	
Date	Time	GPM	(°C)	Month	Gallons/day
12/08/1998	1140	286	7	April	176,019
01/08/1999	1050	4.6	8	May	187,599
02/10/1999	1430	10	9	June	164,732
03/08/1999	1250	2	9	July	213,347
04/11/1999	1240	309	8	August	260,349
04/13/1999	1020	2.3	9	September	231,801
05/10/1999	1220	309	8	October	168,774
06/15/1999	1405	6.7	12	November	89,377
07/07/1999	1525	349	12	December	12,807
08/05/1999	1650	309	11	January	36,124
09/07/1999	1225	2.1	14	February	3,138
10/07/1999	1435	1.36	11	March	16,780
10/20/1999	1315	300	13	April	126,248
11/09/1999	1540	290	9	May	250,725
12/08/1999	1030	6	7	June	282,974
01/17/2000	1345	1	9	July	315,268
02/10/2000	1140	5	8	August	238,266
03/07/2000	1520	No discharge		September	136,403
04/10/2000	1120	5	9	October	117,768
04/25/2000	1427	4.6	13	November	116,911
05/08/2000	1440	7.5	10	December	87,071
06/08/2000	1410	6.67	11	January	26,531
07/20/2000	1120	32	11	February	28,024
08/07/2000	1105	10	12	March	73,252
09/14/2000	950	5.2	12	April	138,278
09/20/2000	1300	8	15	May	44,594
10/16/2000	1455	8	11	June	0
11/06/2000	1120	7.5	7	July	0
11/08/2000	1155	6.69	9	August	40,320
12/14/2000	1625	6.3	6	September	34,128
01/09/2001	1420	8.6	7	October	34,118
02/05/2001	1615	0.3	2	November	34,070
03/20/2001	1355	32	9	December	48,960
04/16/2001	1000	290	10		
05/08/2001	910	300	10		
06/01/2001		NO DISCHARGE			
07/01/2001		NO DISCHARGE			
08/22/2001	936	28	8		
09/18/2001	1600	23.7	8		
10/23/2001	1305	34.11	9		
10/31/2001	942	34.1	9		
11/14/2001	1210	23.66	8		
12/13/2001	1335	34	8		



**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

WILBERG MINE - MILLER CANYON  
 PERMIT # 0022896-004A

Miller Canyon Breakout  
 (MILLER)

Date	Time	Quality		Comments	Month	Quantity
		GPM	Temp. (°C)			
01/08/1999	1021	Dry			January	No Discharge
02/09/1999	1420	Dry			February	No Discharge
03/08/1999	1300	Dry			March	No Discharge
04/11/1999	1248	Dry			April	No Discharge
05/10/1999	1110	Dry			May	No Discharge
06/15/1999	1500	Dry			June	No Discharge
07/22/1999	1455	Dry			July	No Discharge
08/05/1999	1740	Dry			August	No Discharge
09/07/1999	1000	Dry			September	No Discharge
10/07/1999	1435	Dry			October	No Discharge
11/09/1999	1410	Dry			November	No Discharge
12/08/1999	910	Dry			December	No Discharge
01/17/2000	1400	Dry			January	No Discharge
02/10/2000	1239	Dry			February	No Discharge
03/08/2000	1000	Dry			March	No Discharge
04/07/2000	1257	Dry			April	No Discharge
05/08/2000	1405	Dry			May	No Discharge
06/08/2000	1420	Dry			June	No Discharge
07/20/2000	1343	Dry			July	No Discharge
08/07/2000	1221	Dry			August	No Discharge
09/15/2000	1400	Dry			September	No Discharge
10/16/2000	1500	Dry			October	No Discharge
11/06/2000	1210	Dry			November	No Discharge
12/14/2000	1507	Dry			December	No Discharge
01/09/2001	1350	Dry			January	No Discharge
02/05/2001	1540	Dry			February	No Discharge
03/20/2001	1315	Dry			March	No Discharge
04/04/2001	1100	Dry			April	No Discharge
05/08/2001	1006	Dry			May	No Discharge
06/01/2001	940	Dry			June	No Discharge
07/01/2001	1000	Dry			July	No Discharge
08/01/2001	920	Dry			August	No Discharge
09/01/2001	1143	Dry			September	No Discharge
10/31/2001	1000	Dry			October	No Discharge
11/14/2001	1140	Dry			November	No Discharge
12/13/2001	1300	Dry			December	No Discharge

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### DEER CREEK IN-MINE QUALITY & LONG TERM FLOW

QUALITY					LONG TERM FLOW (GPM)		
Date	Location	Time	Temp. (°C)	GPM	Date	Site #1	Site #2
06/22/1998	MAIN N.-MAIN E.	1015	8.1	0.13	03/29/1999	0.1	3.75
06/22/1998	TW-10	950	7.5	5	06/25/1999	0.13	4
06/24/1998	5th North XC-14	1000	10.2	0.5	09/29/1999	0.11	4.62
09/23/1998	TW-10	1215	6	5	12/13/1999	0.19	3.5
09/23/1998	MAIN N.-MAIN E.	1245	7.5	0.15	03/30/2000	0.22	2.75
12/22/1998	TW-10	835	7.5	4.3	06/28/2000	0.11	3.6
12/22/1998	MAIN N.-MAIN E.	410	6	0.15	10/03/2000	0.11	3.6
03/29/1999	TW-10	930	7.5	3.75	12/18/2000	0.11	2.9
03/29/1999	MAIN N.-MAIN E.	1000	6.2	0.1	03/28/2001	0.12	2.4
06/25/1999	TW-10	810	7.1	4	09/26/2001	0.1	3.5
06/25/1999	MAIN N.-MAIN E.	830	7.7	0.13	12/17/2001	0.1	3.3
09/29/1999	TW-10	1000	7.1	4.62			
09/29/1999	MAIN N.-MAIN E.	1035	7.4	0.11			
12/13/1999	TW-10	930	6	3.5			
12/13/1999	MAIN N.-MAIN E.	1100	6	0.19			
03/30/2000	TW-10	1300	6.9	2.75			
03/30/2000	MAIN N.-MAIN E.	1330	5.1	0.22			
06/28/2000	TW-10	1420	6	3.6			
06/28/2000	MAIN N.-MAIN E.	1445	7	0.11			
10/03/2000	TW-10	1010	7.2	3.6			
10/03/2000	MAIN N.-MAIN E.	1030	8.1	0.11			
12/18/2000	TW-10	1430	7.1	2.9			
12/18/2000	MAIN N.-MAIN E.	1415	6.4	0.11			
03/28/2001	TW-10	1250	7.3	2.4			
03/28/2001	MAIN N.-MAIN E.	1315	5	0.12			
* Samples Collected on 6/18/2001, lost in transit, no record at lab							
09/26/2001	TW-10	1313	7.4	3.5			
09/26/2001	MAIN N.-MAIN E.	1335	8.3	0.1			
12/17/2001	TW-10	1015	7.5	3.3			
12/17/2001	MAIN N.-MAIN E.	1030	6.5	0.1			

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### TRAIL MOUNTAIN IN-MINE QUALITY & LONG TERM FLOW

Date	Location	QUALITY			GPM	LONG TERM FLOW (GPM)		
		Time	Temp. (oC)			Date	UG-2	UG-3
09/25/1996	UG-3	1530	11.3		5.0	09/28/1998	*	7.00
12/03/1996	UG-3	1415	11.5		5.0	12/08/1998	*	6.00
03/11/1997	UG-3	1410	14		5.0	03/31/1999	*	7.00
06/26/1997	UG-3	1140	10		7.0	06/21/1999	*	2.00
09/24/1997	UG-3	1040	12		6.0	10/22/1999	*	7.00
12/22/1997	UG-3	1135	4.1		8.6	12/08/1999	*	5.00
03/25/1998	UG-3	820	6.1		7.0	03/20/2000	*	7.00
06/12/1998	UG-3	1030	10.5		7.0	06/16/2000	*	5.00
09/28/1998	UG-3	1200	10.3		7.0	10/03/2000	*	7.00
12/08/1998	UG-3	1330	4.5		6.0	12/13/2000	*	6.00
03/31/1999	UG-3	1040	5.7		7.0	03/08/2001	*	2.60
06/21/1999	UG-3	1420	11.6		2.0			
10/22/1999	UG-3	815	12.1		7.0			
12/08/1999	UG-3	1320	5.6		5.0			
03/20/2000	UG-3	1250	5.8		7.0			
06/16/2000	UG-3	1200	12.6		5.0			
10/03/2000	UG-3	1030	12.4		7.0			
12/13/2000	UG-3	914	4.7		6.0			
03/08/2001	UG-3	1046	5.1		2.6			
06/01/2001		MINE SEALED						

\* UG-2 Monitoring Discontinued, insufficient flow

## WILBERG-COTTONWOOD IN-MINE QUALITY & LONG TERM FLOW

MINE SEALED ON MAY 10, 2001

**PACIFICORP**  
**TECHNICAL SERVICES - HYDROLOGIC MONITORING**

**Sediment Pond Analysis**

**Cottonwood Canyon Creek**  
**Permit # 0022896-002A**

<b>Date</b>	<b>Time</b>	<b>GPM</b>	<b>Temp. (°C)</b>	<b>Weather</b>	<b>Comments</b>
Jan.-Dec., 1986		no discharge			
Jan.-Dec., 1987		no discharge			
Jan.-Dec., 1988		no discharge			
Jan.-Dec., 1989		no discharge			
Jan.-Dec., 1990		no discharge			
Jan.-Dec., 1991		no discharge			
Jan.-Dec., 1992		no discharge			
Jan.-Dec., 1993		no discharge			
Jan.-Dec., 1994		no discharge			
Jan.-Dec., 1995		no discharge			
Jan.-Dec., 1996		no discharge			
Jan.-Dec., 1997		no discharge			
Jan.-Dec., 1998		no discharge			
Jan.-Dec., 1999		no discharge			
Jan-Dec., 2000		no discharge			
Jan-June., 2001		no discharge			
Jan-Dec., 2001		no discharge			

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### Sediment Pond Analysis

Deer Creek  
Permit # 0023604-001

Date	Time	GPM	Temp. (°C)	Weather	Comments
01/06/1999	1420	2	5	clear 30's	
02/09/1999	1325	17	1	cloudy 40's	Prec-Event snow melt
03/08/1999	1005	20	2	pc 30's	
04/11/1999	1050	59	3	clear40's	
04/13/1999	910	54	2	pc40's	No lab samples taken
05/10/1999	925	79	5	pc40's	
06/15/1999	1055	85	11	sunny70's	
07/08/1999	1000	38	14	sunny70's	
08/05/1999	1530	50	14	cloudy70's	
09/07/1999	1600	63	11	sunny80's	
10/07/1999	1035	79	5	sunny40's	
10/20/1999	1444	74	8	clear50's	split with state health
11/09/1999	1335	79	2	sunny50's	
12/07/1999	1425	45	1	cloudy30's	Prec-Event snow
01/24/2000	940	20		cloudy30's	
01/25/2000	1415	15	3	cloudy30's	
02/28/2000		131		ptcloudy30's	
03/07/2000	1347	54	2	sunny40's	
04/05/2000	1355	104		ptcloudy50's	
04/10/2000	1025	125		clear50's	
04/25/2000	1312	79	11	sunny60's	DEQ Water Quality
05/08/2000	1150	54	8	ptcloudy60's	
06/08/2000	1120	54	11	sunny80's	
06/27/2000	1012	25	12	clear80's	
08/07/2000	930	6	13	sunny80's	
09/07/2000	1005	20	11	ptcloudy80's	
09/20/2000	945	38	12	sunny70's	
10/16/2000	1015	63	4	clear30's	
11/06/2000	945	74	2	ptcloudy30's	
11/08/2000	1017	74	4	ptcloudy30's	State sampling
12/14/2000	1410	45	3	cloudy20's	
01/09/2001	1005	32	-1	cloudy30's	
02/05/2001	1445	38	-1	sunny30's	
03/20/2001	1150	54	4	sunny50's	
04/12/2001	1300	79	1	cloudy40's	
04/25/2001	920	85	6	ptcloudy40's	
05/08/2001	1400	50	7	sunny70's	
06/18/2001	1410	74	12	sunny80's	
06/27/2001	908	79	13	ptcloudy80's	State sampling
07/26/2001	1425	54	15	sunny80's	
08/22/2001	818	45	15	sunny90's	State sampling
10/23/2001	845	50	5	cloudy60's	
10/31/2001	820	50	5	cloudy60's	State sampling
11/13/2001	1545	153	4	clear30's	
12/13/2001	1514	17	1	clear20's	

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### Sediment Pond Analysis

Des-Bee-Dove  
Permit # 0023591-001

Date	Time	GPM	Temp. (°C)	Weather	Comments
Apr.-Jun.97	1020	no discharge		pc40's	
07/14/1997	1150	5.0	21	clear80's	Opened valve to decant pond.
August 1998	1430	no discharge			
09/18/1997	1030	40.0	17	clear50's	Opened valve to decant pond.
Oct. - Dec 98	830	no discharge			
Jan. - Apr. 99	1400	no discharge			
March-June 99	1020	no discharge			
Jul-Aug 99	1420	no discharge			
09/07/1999	1445	15.0	17	sunny80's	
Oct.-Dec 99	1020	no discharge			
Jan-Dec.,00		no discharge			
Jan-Sept.,2001		no discharge			
10/31/2001	916	26.0	10		Decanted pond
11/14/2001	1115	25.0	8		Decanted pond
12/13/2001	1409	15.0	-1		Decanted pond

# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### Sediment Pond Analysis

Wilberg Mine  
Permit # 0022896-003A

Date	Time	GPM	Temp. (°C)	Weather	Comments
08/10/1998	1105	31	4	cloudy80's	
09/09/1998	1400	53	14	clear80's	
09/17/1998	1225	17	14	sunny80's	
10/09/1998	1200	14	8	sunny60's	
10/28/1998	930	83	6	sunny50's	Split with State Health
11/05/1998	1205	24	3	clear40's	
12/08/1998	1030	22	-1	pc20's	
12/15/1998	1640	24	3	pc30's	Split with State Health
01/08/1999	1025	37	0	clear 30's	
02/09/1999	1420	25	3	cloudy 40's	Pric-Event snow melt
03/08/1999	1230	35	2	pc 30's	
04/11/1999	1220	25	3	clear40's	
04/13/1999	1005	30	5	pc40's	No lab samples taken
05/10/1999	1155	16	5	pc30's	
06/15/1999	1335	19	12	pc80's	
07/07/1999	1510	10	17	cloudy60's	
08/05/1999	1635	10	14	cloudy70's	
09/07/1999	1200	36	10	sunny80's	
10/07/1999	1420	30	8	sunny60's	
10/20/1999	1330	32	8	clear50's	Split with State Health
11/09/1999	1530	33	3	sunny50's	
12/08/1999	1015	29	0	sunny20's	
01/25/2000	1531	15	5	ptcloudy40's	Split with State Health
02/10/2000	1050	20	2	cloudy30's	Prec-Event snow/rain
03/07/2000	1440	20	4	sunny40's	Est.Flow meter broken
04/10/2000	1110	15	6	ptcloudy50's	Est.Flow meter broken
04/25/2000	1417	15	10	sunny50's	Est.Flow meter broken
05/08/2000	1425	15	10	ptcloudy60's	Est.Flow meter broken
06/08/2000	1350	14	14	cloudy80's	
07/20/2000	1135	11		sunny80's	
08/07/2000	1050	10	15	sunny80's	
09/14/2000	920	11	10	sunny80's	
09/20/2000	1245	10	14	sunny80's	
10/16/2000	1445	14	7	clear60's	
11/06/2000	1105	8	1	ptcloudy30's	
11/08/2000	1143	8	2	ptcloudy30's	state sampling
12/19/2000	1410	48	2	ptcloudy20's	
01/09/2001	1405	25	1	cloudy30's	
02/05/2001	1610	25	0	sunny30's	
03/20/2001	1325	19	5	sunny50's	
April-Dec.2001		No Discharge			



# PACIFICORP

## TECHNICAL SERVICES - HYDROLOGIC MONITORING

### Sediment Pond Analysis

Trail Mountain Mine  
Permit # UTG040003-001

Date	Time	GPM	Temp. (°C)	Weather	Comments
01/23/1998	1139	20	5	clear30's	Prec. Event <10y/24HSnow melting
02/17/1998	1200	50	1.8	cloudy30's	Prec. Event <10y/24HSnow melting
03/04/1998	1230	40	4.6	clear30's	Prec. Event <10y/24HSnow melting
04/13/1998	1025	5	3.4	snow30's	Prec. Event <10y/24H
05/11/1998	1530	60	8.2	pc50's	Discharge Duration 1 Day
06/04/1998	1420	no discharge		cloudy50's	
07/01/1998		no discharge			No discharge 7/1/98-7/31/98
08/01/1998		no discharge			No discharge 8/1/98-8/31/98
09/02/1998	1515	37.5	14.8		Prec. Event
10/09/1998	1125	1.76	8.2	sunny60's	
10/28/1998	1025	30	5.6	sunny50's	Split with state health
11/10/1998	1020	120	11.6	sunny30's	Prec.Event <10y24H
12/08/1998		no discharge			
01/08/1999	1000	1.5	-0.6	clear 20's	
02/17/1999	1135	10	0	pc 40's	Prec-Event snow melt
03/08/1999		No Discharge		pc 30's	
04/11/1999	1405	13	4.4	clear40's	
05/10/1999	1125	0.67	2.2	cloudy30's	
06/15/1999		No Discharge		pc80's	
07/07/1999	1445	12	16.8	cloudy60's	Prec-Event rain
08/05/1999	1730	12	15.4	cloudy70's	
09/07/1999	1055	7.5	12.9	sunny70's	
10/07/1999	1505	2.4	9.2	sunny60's	
11/09/1999		No Discharge		sunny50's	
12/08/1999		No Discharge		sunny20's	
01/12/2000		No Discharge		ptcloudy30's	
02/10/2000		No Discharge		cloudy30's	Prec-Event snow / rain
03/07/2000		No Discharge		sunny40's	
April-Sept.2000		No Discharge		sunny80's	
10/31/2000	1430	100	2.5	cloudy30's	Prec-Event snow
Nov-Dec.2000		No Discharge			
Jan-Dec.2001		No Discharge			

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN PRECIPITATION  
HISTORICAL COMPARISON**

MONTH	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	MIN	MEAN	MAX	ST DEV
OCT	1.28	1.93	0.38	0.76	3.27	1.15	1.57	2.77	0.61	0.28	0.48	0.49	1.57	2.23	1.86	0.18	1.50	0.24	3.01	0.04	3.48	0.04	1.28	3.27	0.97
NOV	0.39	0.53	2.90	2.43	0.97	2.38	0.39	1.91	0.43	0.39	0.26	1.07	0.57	1.12	1.42	0.46	1.63	0.84	1.08	0.05	0.62	0.05	1.06	2.90	0.79
DEC	0.05	0.97	1.39	2.42	1.67	0.87	0.16	1.29	1.56	0.16	0.66	0.07	1.53	0.14	0.65	0.64	1.66	0.23	0.00	0.28	0.39	0.00	0.82	2.42	0.89
JAN	0.29	3.22	1.30	0.27	0.49	0.30	1.37	1.42	1.00	0.74	0.34	0.61	4.10	0.32	1.37	1.39	2.49	0.97	0.75	0.48	1.96	0.27	1.16	4.10	1.00
FEB	0.52	0.14	1.81	0.65	0.59	2.10	1.37	0.00	0.88	2.08	0.39	1.73	2.34	1.35	0.66	1.18	1.56	3.34	0.34	3.27	1.21	0.00	1.31	3.34	0.95
MAR	2.77	1.67	1.98	1.22	1.77	1.43	1.65	0.99	1.03	1.75	2.34	2.39	2.01	0.34	0.79	2.23	0.00	0.71	0.07	1.56	1.03	0.00	1.44	2.77	0.76
APR	0.84	0.00	0.92	0.50	1.35	1.05	1.16	2.08	0.26	1.03	0.59	0.56	0.33	2.65	3.75	0.21	0.40	0.81	2.82	0.15	1.12	0.00	1.06	3.75	0.88
MAY	0.87	0.45	0.71	0.22	1.73	0.38	1.77	1.03	0.47	0.26	1.83	2.19	0.72	0.36	2.29	1.14	0.91	0.37	0.36	0.72	1.39	0.22	0.94	2.29	0.65
JUN	0.11	0.09	0.61	1.18	0.28	0.53	0.58	0.81	0.43	0.67	0.21	0.95	0.19	0.39	1.19	0.30	0.15	0.04	1.21	0.59	0.19	0.04	0.53	1.21	0.37
JUL	0.57	1.86	1.27	1.90	2.47	0.87	2.49	0.45	1.19	0.88	1.01	0.85	0.04	0.10	0.34	0.58	0.15	0.78	2.08	0.03	0.58	0.03	1.00	2.49	0.77
AUG	0.85	1.10	4.83	2.33	0.12	2.24	1.16	0.96	2.44	1.03	1.48	0.48	0.82	0.93	1.52	0.35	1.30	0.57	2.24	2.03	1.09	0.12	1.43	4.83	1.03
SEP	2.55	2.61	1.62	0.84	2.31	1.63	0.06	0.91	0.49	1.62	3.11	0.35	0.14	1.49	0.62	3.46	2.43	2.16	0.78	0.96	0.12	0.06	1.50	3.46	0.99
TOTAL	10.90	14.57	19.71	14.53	17.02	14.92	13.73	14.62	10.59	10.90	12.69	11.74	14.37	11.33	16.46	12.12	11.75	11.05	14.73	10.16	13.17	10.16	13.39	19.71	2.45

EAST MOUNTAIN PRECIPITATION 2001 WATER YEAR	
MONTH	INCHES
Oct-00	3.48
Nov-00	0.62
Dec-00	0.39
Jan-01	1.96
Feb-01	1.21
Mar-01	1.03
Apr-01	1.12
May-01	1.39
Jun-01	0.19
Jul-01	0.58
Aug-01	1.09
Sep-01	0.12
<b>TOTAL</b>	<b>13.17</b>

ENERGY WEST MINING COMPANY EAST MOUNTAIN WEATHER STATION 2001 WATER YEAR		
DATE	TIME	PRECIPITATION

10/10/00	7:24 AM	Start	
10/10/00	6:58 PM	Stop	1.09
10/11/00	3:54 AM	Start	
10/11/00	12:44 PM	Stop	0.24
10/20/00	8:48 PM	Start	
10/21/00	2:15 PM	Stop	0.01
10/21/00	2:15 PM	Start	
10/21/00	5:11 PM	Stop	0.13
10/22/00	3:27 AM	Start	
10/24/00	4:34 AM	Stop	0.70
10/24/00	1:25 PM	Start	
10/24/00	9:59 PM	Stop	0.06
10/26/00	11:09 PM	Start	
10/29/00	2:14 AM	Stop	0.56
10/30/00	3:02 AM	Start	
10/31/00	4:38 PM	Stop	0.69
10/31/00	4:38 PM	Start	3.48 Inches Oct-00
11/01/00	12:00 AM	Stop	0.32
11/01/00	12:00 AM	Start	
11/01/00	8:24 AM	Stop	0.01
11/08/00	9:57 PM	Start	
11/09/00	12:48 AM	Stop	0.06
11/09/00	1:36 PM	Start	
11/10/00	1:51 AM	Stop	0.14
11/11/00	12:17 PM	Start	
11/11/00	1:20 PM	Stop	0.08 0.62 Inches Nov-00
12/10/00	6:46 PM	Start	
12/11/00	1:09 AM	Stop	0.08
12/15/00	5:12 AM	Start	
12/15/00	2:34 PM	Stop	0.30 0.39 Inches Dec-00
01/11/01	6:42 AM	Start	
01/13/01	3:03 AM	Stop	0.91
01/16/01	11:16 AM	Start	
01/16/01	12:54 PM	Stop	0.05
01/17/01	10:54 AM	Start	
01/17/01	2:16 PM	Stop	0.10
01/20/01	5:36 AM	Start	
01/20/01	8:31 AM	Stop	0.05
01/24/01	3:20 PM	Start	
01/25/01	5:20 PM	Stop	0.22
01/27/01	2:47 AM	Start	
01/27/01	1:13 PM	Stop	0.26

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	PRECIPITATION	
01/28/01	11:32 AM	Start	
01/28/01	1:45 PM	Stop	0.18
01/29/01	10:01 AM	Start	
01/29/01	12:53 PM	Stop	0.14
01/30/01	4:19 AM	Start	
01/30/01	7:14 AM	Stop	0.07
			1.96 Inches Jan-01
02/22/01	8:36 PM	Start	
02/23/01	1:15 AM	Stop	0.28
02/23/01	10:43 AM	Start	
02/24/01	3:26 AM	Stop	0.28
02/26/01	5:25 PM	Start	
02/26/01	6:16 PM	Stop	0.07
02/27/01	10:35 AM	Start	
02/28/01	6:02 AM	Stop	0.13
02/28/01	8:49 AM	Start	
02/28/01	8:23 PM	Stop	0.45
			1.21 Inches Feb-01
03/02/01	10:33 PM	Start	
03/03/01	4:55 AM	Stop	0.14
03/07/01	5:39 PM	Start	
03/07/01	5:32 PM	Stop	0.07
03/09/01	11:21 PM	Start	
03/11/01	12:24 AM	Stop	0.72
03/23/01	6:53 PM	Start	
03/24/01	11:43 AM	Stop	0.10
			1.03 Inches Mar-01
04/07/01	9:24 AM	Start	
04/08/01	1:40 AM	Stop	0.34
04/09/01	7:23 PM	Start	
04/10/01	9:46 AM	Stop	0.37
04/10/01	2:43 PM	Start	
04/10/01	7:21 PM	Stop	0.10
04/20/01	10:42 PM	Start	
04/22/01	5:09 PM	Stop	0.31
			1.12 Inches Apr-01
05/02/01	6:51 PM	Start	
05/03/01	8:52 PM	Stop	0.77
05/04/01	3:46 AM	Start	
05/05/01	5:24 PM	Stop	0.30
05/16/01	9:40 PM	Start	
05/17/01	4:31 PM	Stop	0.33
			1.39 Inches May-01
06/24/01	8:27 AM	Start	
06/24/01	10:15 AM	Stop	0.07

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	PRECIPITATION			
06/26/01	5:18 AM	Start			
06/26/01	10:28 PM	Stop	0.12	0.19	Inches Jun-01
07/08/01	6:38 PM	Start			
07/08/01	8:15 PM	Stop	0.20		
07/10/01	11:11 AM	Start			
07/10/01	12:24 PM	Stop	0.07		
07/14/01	6:05 PM	Start			
07/15/01	3:10 PM	Stop	0.31	0.58	Inches Jul-01
08/07/01	2:58 PM	Start			
08/07/01	3:55 PM	Stop	0.04		
586	0.51005	Start			
08/08/01	4:35 PM	Stop	0.08		
08/09/01	3:08 PM	Start			
08/09/01	6:25 PM	Stop	0.11		
08/13/01	12:49 PM	Start			
08/14/01	1:17 PM	Stop	0.86		
08/29/01	3:39 PM	Start			
08/29/01	5:16 PM	Stop	0.09	1.09	Inches Aug-01
09/13/01	4:55 AM	Start			
09/13/01	6:25 AM	Stop	0.06		
09/16/01	10:46 AM	Start			
09/16/01	6:12 PM	Stop	0.07	0.12	Inches Sep-01

13.17 TOTAL

# EAST MOUNTAIN TEMPERATURES - HISTORICAL SUMMARY

OCTOBER SUMMARY		
	HIGH	LOW
AVG.	48.2	32.0
MAX.	71.8	54.9
MIN.	11.6	4.3

FEBRUARY SUMMARY		
	HIGH	LOW
AVG.	32.8	16.7
MAX.	56.3	40.0
MIN.	-2.3	-14.7

JUNE SUMMARY		
	HIGH	LOW
AVG.	67.4	45.0
MAX.	90.9	74.1
MIN.	27.7	13.1

NOVEMBER SUMMARY		
	HIGH	LOW
AVG.	35.6	22.1
MAX.	58.8	44.0
MIN.	9.0	-4.8

MARCH SUMMARY		
	HIGH	LOW
AVG.	39.0	20.9
MAX.	64.6	47.3
MIN.	7.4	-6.6

JULY SUMMARY		
	HIGH	LOW
AVG.	74.3	52.6
MAX.	92.4	69.9
MIN.	48.5	20.4

DECEMBER SUMMARY		
	HIGH	LOW
AVG.	28.7	14.5
MAX.	55.9	41.8
MIN.	-2.6	-17.6

APRIL SUMMARY		
	HIGH	LOW
AVG.	46.2	26.9
MAX.	74.8	51.9
MIN.	12.7	-0.3

AUGUST SUMMARY		
	HIGH	LOW
AVG.	72.3	52.3
MAX.	94.7	70.5
MIN.	35.8	31.8

JANUARY SUMMARY		
	HIGH	LOW
AVG.	29.1	15.2
MAX.	54.0	34.9
MIN.	2.0	-15.2

MAY SUMMARY		
	HIGH	LOW
AVG.	54.9	34.8
MAX.	83.8	62.7
MIN.	15.8	1.8

SEPTEMBER SUMMARY		
	HIGH	LOW
AVG.	62.6	43.3
MAX.	85.6	65.0
MIN.	31.6	20.0

HISTORICAL SUMMARY		
PARAMETER	DATE	TEMP
AVERAGE HIGH	NA	49.3
MAXIMUM HIGH	08-Aug-96	94.7
AVG. MAX. HIGH	NA	73.6
MINIMUM HIGH	22-Dec-91	-2.6
AVG. MIN. HIGH	NA	16.4
AVERAGE LOW	NA	31.4
MAXIMUM LOW	28-Jun-93	74.1
AVG. MAX. LOW	NA	54.7
MINIMUM LOW	22-Dec-90	-17.6
AVG. MIN. LOW	NA	2.7

# EAST MOUNTAIN TEMPERATURES- 2001 WATER YEAR

Oct-00 SUMMARY		
	HIGH	LOW
AVG.	50.3	37.2
MAX.	71.7	54.4
MIN.	33.1	26.3

Feb-01 SUMMARY		
	HIGH	LOW
AVG.	20.3	6.0
MAX.	32.3	17.9
MIN.	5.3	-9.4

Jun-01 SUMMARY		
	HIGH	LOW
AVG.	61.1	39.2
MAX.	74.3	50.6
MIN.	34.2	15.6

Nov-00 SUMMARY		
	HIGH	LOW
AVG.	31.9	18.9
MAX.	44.3	31.5
MIN.	17.3	5.8

Mar-01 SUMMARY		
	HIGH	LOW
AVG.	29.2	15.2
MAX.	40.9	25.5
MIN.	13.1	1.3

Jul-01 SUMMARY		
	HIGH	LOW
AVG.	68.8	47.4
MAX.	81.4	60.9
MIN.	54.7	38.6

Dec-00 SUMMARY		
	HIGH	LOW
AVG.	21.8	9.3
MAX.	31.9	20.2
MIN.	8.8	-5.1

Apr-01 SUMMARY		
	HIGH	LOW
AVG.	37.1	19.3
MAX.	55.4	33.0
MIN.	17.3	1.2

Aug-01 SUMMARY		
	HIGH	LOW
AVG.	59.0	48.2
MAX.	71.3	70.2
MIN.	35.8	35.6

Jan-01 SUMMARY		
	HIGH	LOW
AVG.	18.6	7.4
MAX.	38.4	25.6
MIN.	6.5	-3.4

May-01 SUMMARY		
	HIGH	LOW
AVG.	50.2	31.7
MAX.	66.5	43.7
MIN.	18.9	9.3

Sep-01 SUMMARY		
	HIGH	LOW
AVG.	62.2	40.0
MAX.	69.1	47.8
MIN.	45.6	21.2

2001 SUMMARY		
PARAMETER	DATE	TEMP
AVG. HIGH	#N/A	42.5
MAX. HIGH	07/04/01	81.4
MIN. HIGH	02/09/01	5.3
AVG. LOW	#N/A	26.6
MAX. LOW	08/27/01	70.2
MIN. LOW	02/09/01	-9.4



5. EDIT DATABASE AS NEEDED

ENERGY WEST MINING COMPANY EAST MOUNTAIN WEATHER STATION 2001 WATER YEAR				
DATE	TIME	HIGH	LOW	
10/01/00	6:30 AM	67.6		High
10/01/00	4:09 PM		54.4	Low
10/02/00	12:14 AM		52.2	Low
10/02/00	12:11 PM	71.7		High
10/03/00	11:24 AM	67.6		High
10/03/00	9:47 PM		49.5	Low
10/04/00	11:08 AM	64.7		High
10/04/00	10:57 PM		44.5	Low
10/05/00	4:13 AM		40.5	Low
10/05/00	10:34 AM	63.1		High
10/06/00	5:04 AM		43.0	Low
10/06/00	12:06 PM	65.8		High
10/07/00	10:55 AM	65.9		High
10/07/00	9:53 PM		45.5	Low
10/08/00	10:47 AM	61.6		High
10/08/00	9:51 PM		43.2	Low
10/09/00	9:32 AM	59.2		High
10/09/00	10:25 PM		43.1	Low
10/10/00	2:19 AM	41.3		High
10/10/00	10:17 PM		33.2	Low
10/11/00	10:12 AM	46.1		High
10/11/00	10:41 PM		30.3	Low
10/12/00	8:46 AM	39.0		High
10/12/00	10:36 PM		28.5	Low
10/13/00	8:56 AM	43.3		High
10/13/00	10:39 PM		30.3	Low
10/14/00	3:26 AM		29.2	Low
10/14/00	9:32 AM	48.1		High
10/15/00	9:35 AM	49.4		High
10/15/00	9:36 PM		33.3	Low
10/16/00	3:19 AM		34.0	Low
10/16/00	10:23 AM	52.7		High
10/17/00	10:56 AM	56.4		High
10/17/00	11:25 PM		40.6	Low
10/18/00	5:27 AM		39.6	Low
10/18/00	10:40 AM	55.4		High
10/19/00	10:52 AM	59.7		High
10/19/00	11:24 PM		43.7	Low
10/20/00	11:26 AM	59.7		High
10/20/00	8:02 PM		44.0	Low
10/21/00	7:08 AM	47.6		High

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
10/21/00	9:33 PM		34.2	Low
10/22/00	2:55 AM		35.2	Low
10/22/00	5:11 AM	37.5		High
10/23/00	4:41 AM	41.4		High
10/23/00	8:43 PM		34.2	Low
10/24/00	7:48 AM	41.8		High
10/24/00	7:51 PM		29.1	Low
10/25/00	4:03 AM	36.2		High
10/25/00	10:16 PM		33.4	Low
10/26/00	5:42 AM	35.7		High
10/26/00	8:41 PM		35.0	Low
10/27/00	4:37 AM	40.0		High
10/27/00	8:35 PM		34.3	Low
10/28/00	4:44 AM	39.2		High
10/28/00	9:09 PM		29.2	Low
10/29/00	1:49 AM	36.2		High
10/29/00	9:35 PM		31.7	Low
10/30/00	3:58 AM	33.8		High
10/30/00	9:56 PM		27.7	Low
10/31/00	4:22 AM	33.1		High
10/31/00	12:32 PM		26.3	Low
11/01/00	6:47 AM	28.0		High
11/01/00	9:24 PM		21.0	Low
11/02/00	5:13 AM		19.5	Low
11/02/00	1:43 PM	34.9		High
11/03/00	6:55 AM		17.6	Low
11/03/00	12:01 PM	35.7		High
11/04/00	7:47 AM		25.8	Low
11/04/00	12:27 PM	41.1		High
11/05/00	2:02 AM	30.1		High
11/05/00	11:10 PM		18.7	Low
11/06/00	2:21 PM	26.9		High
11/06/00	10:54 PM		15.2	Low
11/07/00	8:42 AM		11.1	Low
11/07/00	1:28 PM	27.1		High
11/08/00	7:10 AM		17.2	Low
11/08/00	12:24 PM	31.4		High
11/09/00	10:04 AM	28.8		High
11/09/00	8:22 PM		20.7	Low
11/10/00	10:20 AM	27.3		High
11/10/00	11:30 PM		12.3	Low
11/11/00	10:43 AM	28.1		High
11/11/00	11:31 PM		12.1	Low
11/12/00	11:04 AM	17.3		High
11/12/00	8:42 PM		7.9	Low
11/13/00	7:28 AM		5.8	Low

	Oct-00	SUMMARY
	HIGH	LOW
AVG.	50.3	37.2
MAX.	71.7	54.4
MIN.	33.1	26.3

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
11/13/00	11:20 AM	22.3		High
11/14/00	7:39 AM		10.0	Low
11/14/00	1:12 PM	21.6		High
11/15/00	8:53 AM	19.3		High
11/15/00	11:53 PM		10.9	Low
11/16/00	10:43 AM	21.9		High
11/16/00	10:19 PM		8.3	Low
11/17/00	11:37 AM	22.1		High
11/17/00	8:06 PM		9.9	Low
11/18/00	3:02 AM		12.2	Low
11/18/00	10:36 AM	32.5		High
11/19/00	6:54 AM		23.2	Low
11/19/00	11:31 AM	41.5		High
11/20/00	12:29 PM	37.4		High
11/20/00	9:46 PM		26.1	Low
11/21/00	12:06 PM	37.4		High
11/21/00	9:00 PM		25.6	Low
11/22/00	7:33 AM		23.7	Low
11/22/00	11:38 AM	36.4		High
11/23/00	12:20 PM	44.3		High
11/23/00	8:30 PM		29.6	Low
11/24/00	11:28 AM	38.2		High
11/24/00	7:29 PM		23.7	Low
11/25/00	8:08 AM		20.4	Low
11/25/00	12:13 PM	34.3		High
11/26/00	11:55 AM	39.7		High
11/26/00	7:31 PM		29.0	Low
11/27/00	11:21 AM	38.4		High
11/27/00	6:45 PM		31.5	Low
11/28/00	9:51 AM	38.4		High
11/28/00	6:25 PM		27.5	Low
11/29/00	11:27 AM	37.7		High
11/29/00	6:16 PM		27.5	Low
11/30/00	12:09 PM	36.8		High
11/30/00	9:28 PM		23.6	Low
12/01/00	8:12 AM	29.4		High
12/01/00	5:00 PM		11.8	Low
12/02/00	6:17 AM		10.9	Low
12/02/00	10:06 AM	22.4		High
12/03/00	4:10 AM		17.9	Low
12/03/00	7:39 AM	31.9		High
12/04/00	5:04 AM		20.2	Low
12/04/00	8:26 AM	31.3		High
12/05/00	9:40 AM	30.9		High
12/05/00	5:48 PM		19.9	Low
12/06/00	3:48 AM		13.5	Low

	Nov-00	SUMMARY
	HIGH	LOW
AVG.	31.9	18.9
MAX.	44.3	31.5
MIN.	17.3	5.8

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
12/06/00	9:14 AM	26.1		High
12/07/00	4:31 AM		13.0	Low
12/07/00	8:55 AM	27.2		High
12/08/00	7:22 AM	21.5		High
12/08/00	5:36 PM		15.7	Low
12/09/00	8:43 AM	23.1		High
12/09/00	6:47 PM		12.8	Low
12/10/00	6:09 AM	20.4		High
12/10/00	8:52 PM		2.2	Low
12/11/00	6:10 AM		-2.8	Low
12/11/00	9:30 AM	8.8		High
12/12/00	6:39 AM	11.3		High
12/12/00	9:11 PM		4.3	Low
12/13/00	3:40 AM		3.5	Low
12/13/00	6:22 AM	12.8		High
12/14/00	5:37 AM	15.1		High
12/14/00	4:37 PM		8.0	Low
12/15/00	12:20 AM	12.5		High
12/15/00	3:53 PM		3.0	Low
12/16/00	4:13 AM		4.7	Low
12/16/00	7:25 AM	17.0		High
12/17/00	4:17 AM	19.4		High
12/17/00	9:32 PM		-2.0	Low
12/18/00	4:35 AM		-5.1	Low
12/18/00	7:23 AM	9.1		High
12/19/00	3:03 AM		4.0	Low
12/19/00	12:54 PM	19.8		High
12/20/00	5:41 AM	15.5		High
12/20/00	6:59 PM		7.7	Low
12/21/00	5:23 AM	21.7		High
12/21/00	5:33 PM		5.0	Low
12/22/00	7:53 AM	22.0		High
12/22/00	7:02 PM		9.1	Low
12/23/00	8:07 AM	23.8		High
12/23/00	9:36 PM		8.8	Low
12/24/00	8:18 AM	19.5		High
12/24/00	8:50 PM		7.3	Low
12/25/00	7:07 AM	14.2		High
12/25/00	1:52 PM		7.7	Low
12/26/00	5:43 AM		10.7	Low
12/26/00	9:56 AM	28.6		High
12/27/00	4:17 AM		17.7	Low
12/27/00	10:05 AM	31.8		High
12/28/00	10:51 AM	27.5		High
12/28/00	7:54 PM		16.3	Low
12/29/00	5:02 AM		16.3	Low
12/29/00	12:05 PM	30.1		High

**Dec-00 SUMMARY**

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW				
12/30/00	9:52 AM	26.3		High		HIGH	LOW
12/30/00	9:40 PM		13.7	Low	AVG.	21.8	9.3
12/31/00	9:37 AM	23.7		High	MAX.	31.9	20.2
12/31/00	5:43 PM		11.8	Low	MIN.	8.8	-5.1
01/01/01	9:21 AM	22.9		High			
01/02/01	5:52 AM		9.9	Low			
01/02/01	2:31 PM	26.5		High			
01/02/01	6:51 PM		15.8	Low			
01/03/01	12:52 PM	35.5		High			
01/03/01	6:18 PM		23.4	Low			
01/04/01	8:22 AM		23.7	Low			
01/04/01	1:09 PM	37.7		High			
01/05/01	7:17 AM		25.6	Low			
01/05/01	10:59 AM	38.4		High			
01/06/01	12:10 PM	37.1		High			
01/06/01	6:52 PM		22.6	Low			
01/07/01	8:35 AM		9.2	Low			
01/07/01	12:21 PM	23.1		High			
01/08/01	8:37 AM		6.7	Low			
01/08/01	11:01 AM	19.0		High			
01/09/01	3:55 AM		10.7	Low			
01/09/01	9:42 AM	20.4		High			
01/10/01	10:36 AM	19.6		High			
01/10/01	3:56 PM		9.8	Low			
01/11/01	4:20 AM		11.2	Low			
01/11/01	7:45 PM	11.5		High			
01/12/01	10:55 AM	15.8		High			
01/12/01	8:53 PM		5.9	Low			
01/13/01	9:25 AM	11.7		High			
01/13/01	8:47 PM		0.8	Low			
01/14/01	11:09 AM	13.8		High			
01/14/01	6:51 PM		0.5	Low			
01/15/01	10:52 AM	8.7		High			
01/15/01	7:17 PM		1.3	Low			
01/16/01	10:11 AM	7.0		High			
01/16/01	8:11 PM		-1.4	Low			
01/17/01	9:46 AM	12.2		High			
01/17/01	9:12 PM		2.9	Low			
01/18/01	10:20 AM	15.8		High			
01/18/01	6:38 PM		3.8	Low			
01/19/01	6:42 AM		5.5	Low			
01/19/01	9:56 AM	17.8		High			
01/20/01	10:33 AM	14.6		High			
01/20/01	6:04 PM		5.8	Low			
01/21/01	5:31 AM		4.6	Low			
01/21/01	11:37 AM	23.7		High			

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
01/22/01	10:39 AM	19.5		High
01/22/01	7:51 PM		8.5	Low
01/23/01	5:45 AM		7.0	Low
01/23/01	10:53 AM	22.7		High
01/24/01	8:31 AM	12.2		High
01/24/01	7:45 PM		8.2	Low
01/25/01	8:14 AM	11.8		High
01/25/01	5:10 PM		1.5	Low
01/26/01	9:33 AM	13.4		High
01/26/01	4:02 PM		2.2	Low
01/27/01	7:37 AM	12.8		High
01/27/01	8:17 PM		3.0	Low
01/28/01	6:34 AM	14.2		High
01/28/01	5:15 PM		2.2	Low
01/29/01	12:19 PM	20.3		High
01/29/01	8:52 PM		4.2	Low
01/30/01	10:04 AM	6.5		High
01/30/01	9:04 PM		-2.4	Low
01/31/01	5:21 AM		-3.4	Low
01/31/01	11:01 AM	9.5		High
02/01/01	3:13 AM		3.5	Low
02/01/01	11:42 AM	21.9		High
02/02/01	7:55 AM		13.0	Low
02/02/01	12:32 PM	27.5		High
02/03/01	12:54 PM	24.0		High
02/03/01	7:30 PM		13.2	Low
02/04/01	5:30 AM		11.2	Low
02/04/01	11:43 AM	32.3		High
02/05/01	11:13 AM	28.9		High
02/05/01	8:25 PM		17.9	Low
02/06/01	5:57 AM		13.6	Low
02/06/01	10:07 AM	23.2		High
02/07/01	11:07 AM	24.9		High
02/07/01	9:27 PM		7.8	Low
02/08/01	10:30 AM	14.1		High
02/08/01	9:28 PM		-2.9	Low
02/09/01	7:45 AM		-9.4	Low
02/09/01	11:18 AM	5.3		High
02/10/01	5:18 AM		-2.6	Low
02/10/01	11:56 AM	8.7		High
02/11/01	8:40 AM	12.6		High
02/11/01	7:37 PM		1.7	Low
02/12/01	4:19 AM		2.4	Low
02/12/01	9:03 AM	13.9		High
02/13/01	9:31 AM	22.0		High
02/13/01	9:01 PM		7.9	Low

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
02/14/01	9:37 AM	15.1		High
02/14/01	10:15 PM		-3.3	Low
02/15/01	6:39 AM		-3.2	Low
02/15/01	8:51 AM	16.8		High
02/16/01	4:53 AM		2.5	Low
02/16/01	8:41 AM	19.1		High
02/17/01	3:50 AM		5.0	Low
02/17/01	10:27 AM	20.7		High
02/18/01	3:34 AM		10.5	Low
02/18/01	10:10 AM	18.9		High
02/19/01	9:11 AM	25.7		High
02/19/01	7:54 PM		11.0	Low
02/20/01	9:09 AM	26.4		High
02/20/01	9:24 PM		13.6	Low
02/21/01	9:22 AM	25.1		High
02/21/01	8:10 PM		11.0	Low
02/22/01	8:54 AM	27.9		High
02/22/01	7:54 PM		11.8	Low
02/23/01	9:14 AM	21.5		High
02/23/01	9:40 PM		3.7	Low
02/24/01	4:35 AM		1.9	Low
02/24/01	8:48 AM	15.5		High
02/25/01	7:37 AM	20.6		High
02/25/01	6:53 PM		5.9	Low
02/26/01	6:08 AM	18.9		High
02/26/01	5:34 PM		6.3	Low
02/27/01	5:18 AM	19.7		High
02/27/01	7:32 PM		9.0	Low
02/28/01	5:35 AM	17.9		High
02/28/01	8:25 PM		4.6	Low
03/01/01	6:42 AM	22.9		High
03/01/01	7:57 PM		2.8	Low
03/02/01	8:54 AM	18.1		High
03/02/01	7:30 PM		8.6	Low
03/03/01	6:29 AM	22.2		High
03/03/01	7:13 PM		6.1	Low
03/04/01	5:12 AM	24.3		High
03/04/01	6:28 PM		13.0	Low
03/05/01	8:44 AM	30.2		High
03/05/01	8:24 PM		17.3	Low
03/06/01	7:05 AM	35.2		High
03/06/01	8:37 PM		19.8	Low
03/07/01	8:28 AM	24.0		High
03/07/01	8:39 PM		16.0	Low
03/08/01	7:59 AM	37.4		High
03/08/01	8:33 PM		17.9	Low

	Feb-01	SUMMARY
	HIGH	LOW
AVG.	20.3	6.0
MAX.	32.3	17.9
MIN.	5.3	-9.4

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
03/09/01	5:49 AM	30.1		High
03/09/01	8:20 PM		15.5	Low
03/10/01	5:29 AM	23.4		High
03/10/01	7:04 PM		13.7	Low
03/11/01	6:32 AM	19.8		High
03/11/01	6:46 PM		6.8	Low
03/12/01	7:56 AM	29.1		High
03/12/01	9:04 PM		8.7	Low
03/13/01	5:57 AM	31.7		High
03/13/01	7:58 PM		15.9	Low
03/14/01	4:21 AM	13.1		High
03/14/01	8:58 PM		1.3	Low
03/15/01	6:34 AM	25.2		High
03/15/01	8:25 PM		6.7	Low
03/16/01	6:29 AM	17.1		High
03/16/01	4:05 PM		7.8	Low
03/17/01	5:03 AM	29.3		High
03/17/01	4:41 PM		12.4	Low
03/18/01	4:49 AM	27.5		High
03/18/01	6:17 PM		17.6	Low
03/19/01	1:42 AM		16.5	Low
03/19/01	7:39 AM	36.9		High
03/20/01	5:26 AM	39.7		High
03/20/01	9:29 PM		25.5	Low
03/21/01	3:58 AM	39.8		High
03/21/01	10:10 PM		23.9	Low
03/22/01	6:58 AM	37.6		High
03/22/01	9:14 PM		20.9	Low
03/23/01	6:20 AM	33.7		High
03/23/01	6:32 PM		19.8	Low
03/24/01	3:48 AM	38.5		High
03/24/01	8:08 PM		23.5	Low
03/25/01	7:04 AM	40.9		High
03/25/01	8:07 PM		25.3	Low
03/26/01	4:40 AM	34.4		High
03/26/01	9:12 PM		17.5	Low
03/27/01	6:37 AM	28.1		High
03/27/01	6:57 PM		16.8	Low
03/28/01	5:00 AM	25.8		High
03/28/01	6:50 PM		17.9	Low
03/29/01	2:23 AM	24.3		High
03/29/01	6:04 PM		14.6	Low
03/30/01	4:11 AM	28.9		High
03/30/01	7:01 PM		16.6	Low
03/31/01	5:30 AM	35.0		High
03/31/01	5:12 PM		24.0	Low

	Mar-01	SUMMARY
	HIGH	LOW
AVG.	29.2	15.2
MAX.	40.9	25.5
MIN.	13.1	1.3



**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
04/01/01	7:13 AM	40.2		High
04/01/01	8:05 PM		23.7	Low
04/02/01	6:50 AM	38.7		High
04/02/01	8:26 PM		18.8	Low
04/03/01	1:37 AM		18.7	Low
04/03/01	12:01 PM	34.4		High
04/04/01	5:19 AM		19.0	Low
04/04/01	1:24 PM	35.0		High
04/05/01	11:27 AM	32.4		High
04/05/01	9:21 PM		18.5	Low
04/06/01	12:22 PM	27.1		High
04/06/01	8:52 PM		16.2	Low
04/07/01	2:19 PM	22.0		High
04/07/01	9:06 PM		9.9	Low
04/08/01	10:08 AM	18.0		High
04/08/01	7:56 PM		5.0	Low
04/09/01	4:13 AM		1.2	Low
04/09/01	11:53 AM	28.7		High
04/10/01	10:10 AM	20.5		High
04/10/01	9:56 PM		8.4	Low
04/11/01	5:28 AM		9.5	Low
04/11/01	9:47 AM	30.5		High
04/12/01	6:18 AM	17.3		High
04/12/01	6:43 PM		6.6	Low
04/13/01	3:29 AM		4.7	Low
04/13/01	11:54 AM	28.0		High
04/14/01	5:43 AM		16.8	Low
04/14/01	1:20 PM	31.8		High
04/15/01	5:26 AM		20.2	Low
04/15/01	12:00 PM	43.3		High
04/16/01	5:09 AM		26.0	Low
04/16/01	4:01 PM	47.0		High
04/17/01	5:09 AM		29.7	Low
04/17/01	2:26 PM	53.7		High
04/18/01	2:14 PM	54.3		High
04/18/01	9:22 PM		32.2	Low
04/19/01	12:55 PM	48.0		High
04/19/01	8:15 PM		27.8	Low
04/20/01	11:11 AM	28.0		High
04/20/01	5:58 PM		16.3	Low
04/21/01	8:10 AM	25.4		High
04/21/01	5:17 PM		12.3	Low
04/22/01	10:24 AM	23.2		High
04/22/01	7:13 PM		15.3	Low
04/23/01	4:49 AM		14.1	Low
04/23/01	2:28 PM	36.0		High
04/24/01	5:13 AM		23.1	Low

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
04/24/01	12:23 PM	46.3		High
04/25/01	5:24 AM		28.5	Low
04/25/01	3:54 PM	50.8		High
04/26/01	6:14 AM		33.0	Low
04/26/01	2:27 PM	53.8		High
04/27/01	9:59 AM	48.0		High
04/27/01	8:24 PM		31.4	Low
04/28/01	2:59 AM		28.4	Low
04/28/01	12:37 PM	49.2		High
04/29/01	11:25 AM	45.9		High
04/29/01	7:42 PM		32.9	Low
04/30/01	3:53 AM		29.6	Low
04/30/01	2:39 PM	55.4		High
05/01/01	12:45 PM	51.0		High
05/01/01	8:48 PM		30.3	Low
05/02/01	6:40 AM	19.3		High
05/02/01	8:16 PM		9.3	Low
05/03/01	9:31 AM	18.9		High
05/03/01	6:28 PM		13.6	Low
05/04/01	5:56 AM		14.7	Low
05/04/01	10:51 PM	21.4		High
05/05/01	9:01 AM	30.9		High
05/05/01	9:31 PM		24.4	Low
05/06/01	4:28 AM		23.2	Low
05/06/01	12:37 PM	37.7		High
05/07/01	3:12 AM		27.0	Low
05/07/01	10:17 AM	45.7		High
05/08/01	4:35 AM		32.6	Low
05/08/01	12:23 PM	55.3		High
05/09/01	4:53 AM		39.1	Low
05/09/01	1:01 PM	56.8		High
05/10/01	12:50 PM	54.4		High
05/10/01	8:52 PM		35.0	Low
05/11/01	4:00 AM		31.8	Low
05/11/01	12:58 PM	59.6		High
05/12/01	4:38 AM		38.4	Low
05/12/01	1:54 PM	62.3		High
05/13/01	9:22 AM	54.5		High
05/13/01	9:43 PM		33.8	Low
05/14/01	4:50 AM		30.9	Low
05/14/01	10:29 AM	55.8		High
05/15/01	3:40 AM		38.9	Low
05/15/01	12:56 PM	53.8		High
05/16/01	10:36 AM	49.8		High
05/16/01	9:20 PM		28.6	Low
05/17/01	2:35 AM		27.9	Low

	Apr-01	SUMMARY
	HIGH	LOW
AVG.	37.1	19.3
MAX.	55.4	33.0
MIN.	17.3	1.2

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
05/17/01	7:47 AM	42.3		High
05/18/01	4:27 AM	44.0		High
05/18/01	7:11 PM		30.6	Low
05/19/01	11:08 AM	48.7		High
05/19/01	8:08 PM		35.2	Low
05/20/01	9:36 AM	46.0		High
05/20/01	9:17 PM		23.5	Low
05/21/01	4:06 AM		19.0	Low
05/21/01	11:40 AM	43.7		High
05/22/01	3:59 AM		34.2	Low
05/22/01	11:49 AM	57.5		High
05/23/01	5:04 AM		38.6	Low
05/23/01	2:15 PM	62.8		High
05/24/01	6:11 AM		42.2	Low
05/24/01	1:23 PM	62.3		High
05/25/01	5:16 AM		42.6	Low
05/25/01	1:48 PM	62.7		High
05/26/01	5:58 AM		43.6	Low
05/26/01	1:53 PM	66.5		High
05/27/01	7:17 AM		43.7	Low
05/27/01	1:54 PM	62.9		High
05/28/01	1:10 PM	60.5		High
05/28/01	7:34 PM		40.4	Low
05/29/01	1:40 PM	57.3		High
05/29/01	9:28 PM		38.5	Low
05/30/01	5:33 AM		35.1	Low
05/30/01	11:43 AM	51.7		High
05/31/01	7:28 AM		37.3	Low
05/31/01	1:17 PM	61.1		High
06/01/01	3:26 AM		39.4	Low
06/01/01	9:49 AM	52.2		High
06/02/01	1:34 PM	67.7		High
06/02/01	6:47 PM		47.9	Low
06/03/01	8:50 AM	60.3		High
06/03/01	10:01 PM		40.9	Low
06/04/01	1:02 PM	51.9		High
06/04/01	9:52 PM		23.9	Low
06/05/01	4:31 AM		18.5	Low
06/05/01	12:03 PM	45.9		High
06/06/01	3:23 AM		30.4	Low
06/06/01	11:03 AM	58.3		High
06/07/01	4:31 AM		39.7	Low
06/07/01	10:29 AM	60.2		High
06/08/01	4:54 AM		43.7	Low
06/08/01	12:10 PM	63.6		High
06/09/01	10:23 AM	65.0		High

	May-01	SUMMARY
	HIGH	LOW
AVG.	50.2	31.7
MAX.	66.5	43.7
MIN.	18.9	9.3

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
06/09/01	8:44 PM		47.0	Low
06/10/01	3:42 AM		44.5	Low
06/10/01	1:23 PM	67.5		High
06/11/01	1:26 PM	67.1		High
06/11/01	9:15 PM		48.4	Low
06/12/01	12:33 PM	65.6		High
06/12/01	10:18 PM		45.5	Low
06/13/01	10:14 AM	53.1		High
06/13/01	9:15 PM		19.6	Low
06/14/01	2:00 AM		15.6	Low
06/14/01	9:02 AM	34.2		High
06/15/01	2:46 AM		21.9	Low
06/15/01	11:01 AM	49.6		High
06/16/01	3:49 AM		33.7	Low
06/16/01	1:03 PM	60.7		High
06/17/01	3:40 AM		46.2	Low
06/17/01	1:47 PM	70.0		High
06/18/01	4:18 AM		44.6	Low
06/18/01	2:33 PM	69.3		High
06/19/01	11:31 AM	64.1		High
06/19/01	9:37 PM		45.7	Low
06/20/01	2:14 AM		42.6	Low
06/20/01	10:48 AM	66.0		High
06/21/01	4:28 AM		46.3	Low
06/21/01	12:55 PM	66.5		High
06/22/01	1:16 PM	67.2		High
06/22/01	8:30 PM		48.7	Low
06/23/01	1:13 PM	71.1		High
06/23/01	10:12 PM		50.6	Low
06/24/01	10:41 AM	63.9		High
06/24/01	8:21 PM		44.3	Low
06/25/01	2:05 PM	58.2		High
06/25/01	9:13 PM		43.0	Low
06/26/01	3:22 AM		41.2	Low
06/26/01	11:25 AM	63.9		High
06/27/01	4:13 AM	47.0		High
06/27/01	6:12 PM		32.5	Low
06/28/01	1:57 AM		34.0	Low
06/28/01	10:52 AM	57.9		High
06/29/01	3:14 AM		45.4	Low
06/29/01	1:33 PM	70.1		High
06/30/01	5:19 AM		50.3	Low
06/30/01	4:29 PM	74.3		High
07/01/01	8:31 AM		49.8	Low
07/01/01	5:04 PM	76.7		High
07/02/01	6:22 PM	68.2		High

	Jun-01	SUMMARY
	HIGH	LOW
AVG.	61.1	39.2
MAX.	74.3	50.6
MIN.	34.2	15.6

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
07/02/01	10:00 PM		51.6	Low
07/03/01	5:18 AM		46.8	Low
07/03/01	12:56 PM	80.8		High
07/04/01	5:48 AM		60.9	Low
07/04/01	12:54 PM	81.4		High
07/05/01	12:14 AM		59.5	Low
07/05/01	11:17 AM	76.9		High
07/06/01	6:01 AM		52.5	Low
07/06/01	11:54 AM	74.3		High
07/07/01	10:49 AM	68.5		High
07/07/01	8:13 PM		47.9	Low
07/08/01	12:39 PM	72.9		High
07/08/01	6:48 PM		47.2	Low
07/09/01	11:59 AM	66.5		High
07/09/01	7:07 PM		47.7	Low
07/10/01	6:49 AM	57.5		High
07/10/01	6:59 PM		43.4	Low
07/11/01	7:19 AM	57.9		High
07/11/01	7:39 PM		45.5	Low
07/12/01	3:06 AM		45.0	Low
07/12/01	8:46 AM	64.6		High
07/13/01	9:03 AM	63.2		High
07/13/01	6:12 PM		44.4	Low
07/14/01	12:19 PM	55.3		High
07/14/01	7:06 PM		38.6	Low
07/15/01	11:04 AM	55.4		High
07/15/01	8:36 PM		38.8	Low
07/16/01	3:44 AM		41.0	Low
07/16/01	12:01 PM	64.4		High
07/17/01	7:08 AM		40.5	Low
07/17/01	12:27 PM	66.0		High
07/18/01	4:26 AM		44.7	Low
07/18/01	12:48 PM	65.3		High
07/19/01	4:35 AM		48.3	Low
07/19/01	11:57 AM	72.2		High
07/20/01	4:24 AM		48.4	Low
07/20/01	11:59 AM	70.1		High
07/21/01	4:34 AM		48.9	Low
07/21/01	11:30 AM	71.8		High
07/22/01	12:00 PM	72.2		High
07/22/01	7:48 PM		47.8	Low
07/23/01	4:31 AM		48.9	Low
07/23/01	12:06 PM	72.5		High
07/24/01	10:32 AM	70.9		High
07/24/01	7:36 PM		50.0	Low
07/25/01	9:55 AM	71.6		High
07/25/01	6:29 PM		46.9	Low

ENERGY WEST MINING COMPANY EAST MOUNTAIN WEATHER STATION 2001 WATER YEAR				
DATE	TIME	HIGH	LOW	

07/26/01	10:19 AM	54.7		High
07/26/01	6:08 PM		41.2	Low
07/27/01	1:05 AM		43.9	Low
07/27/01	12:49 PM	69.0		High
07/28/01	5:07 AM		50.0	Low
07/28/01	1:56 PM	73.3		High
07/29/01	12:19 PM	77.8		High
07/29/01	7:27 PM		55.5	Low
07/30/01	9:14 AM	73.0		High
07/30/01	7:42 PM		48.0	Low
07/31/01	2:50 AM		45.0	Low
07/31/01	12:14 PM	68.7		High

	Jul-01	SUMMARY
	HIGH	LOW
AVG.	68.8	47.4
MAX.	81.4	60.9
MIN.	54.7	38.6

08/01/01	5:05 AM		48.0	Low
08/01/01	11:48 AM	71.3		High
08/02/01	3:04 AM		48.1	Low
08/02/01	10:03 AM	67.5		High
08/03/01	2:33 AM		49.7	Low
08/03/01	11:37 AM	69.0		High
08/04/01	3:18 AM		43.0	Low
08/04/01	7:21 AM	52.5		High
08/04/01	6:39 PM	46.3		High
08/05/01	2:46 AM		45.0	Low
08/05/01	2:12 PM	69.8		High
08/06/01	12:07 PM		66.2	Low
08/06/01	8:11 PM		53.8	Low
08/07/01	12:52 PM	65.9		High
08/07/01	7:14 PM		47.2	Low
08/08/01	10:16 AM	59.9		High
08/08/01	8:49 PM	43.9		High
08/09/01	2:35 AM		41.3	Low
08/09/01	11:59 AM	63.1		High
08/10/01	4:44 AM		41.0	Low
08/10/01	10:37 AM	60.8		High
08/11/01	5:39 AM		45.3	Low
08/11/01	12:10 PM	63.5		High
08/12/01	5:26 AM		48.6	Low
08/12/01	11:20 AM	69.3		High
08/13/01	9:04 AM		56.4	Low
08/13/01	8:44 PM		38.9	Low
08/14/01	4:01 AM	39.1		High
08/14/01	12:57 PM		59.1	Low
08/15/01	12:03 PM	64.4		High
08/15/01	7:24 PM		44.0	Low
08/16/01	10:36 AM	62.8		High
08/16/01	8:41 PM	44.3		High
08/17/01	4:18 AM		43.7	Low

ENERGY WEST MINING COMPANY EAST MOUNTAIN WEATHER STATION 2001 WATER YEAR				
DATE	TIME	HIGH	LOW	

08/17/01	11:06 AM	67.7		High
08/18/01	4:27 AM		47.9	Low
08/18/01	1:29 PM	70.3		High
08/19/01	9:27 AM		63.4	Low
08/19/01	7:40 PM		46.4	Low
08/20/01	9:55 AM	56.8		High
08/20/01	9:08 PM		39.1	Low
08/21/01	6:40 AM	56.8		High
08/21/01	6:30 PM		35.6	Low
08/22/01	8:42 AM	50.9		High
08/22/01	8:06 PM		35.7	Low
08/23/01	2:20 AM	35.8		High
08/23/01	11:58 AM		59.6	Low
08/24/01	12:02 PM	62.8		High
08/24/01	6:49 PM	44.5		High
08/25/01	3:35 AM		44.0	Low
08/25/01	12:31 PM	68.0		High
08/26/01	4:17 AM		48.9	Low
08/26/01	1:18 PM	71.0		High
08/27/01	9:51 AM		70.2	Low
08/27/01	7:31 PM		51.4	Low
08/28/01	9:27 AM	66.5		High
08/28/01	8:31 PM		48.9	Low
08/29/01	10:28 AM	67.9		High
08/29/01	6:07 PM		44.8	Low
08/30/01	10:32 AM	53.7		High
08/30/01	4:22 PM	42.2		High
08/31/01	2:15 AM		39.7	Low
08/31/01	9:55 AM	61.7		High
09/01/01	4:35 AM		42.5	Low
09/01/01	2:05 PM	61.5		High
09/02/01	4:36 AM		43.6	Low
09/02/01	11:37 AM	65.8		High
09/03/01	4:37 AM		46.9	Low
09/03/01	12:11 PM	68.4		High
09/04/01	2:07 AM		47.8	Low
09/04/01	10:04 AM	69.0		High
09/05/01	12:05 PM	66.9		High
09/05/01	6:57 PM		47.6	Low
09/06/01	3:09 AM	45.6		High
09/06/01	9:02 PM		28.4	Low
09/07/01	9:21 AM	53.1		High
09/07/01	10:12 PM		25.9	Low
09/08/01	5:04 AM		21.2	Low
09/08/01	9:59 AM	46.5		High
09/09/01	6:24 AM		27.0	Low

	Aug-01	SUMMARY
	HIGH	LOW
AVG.	59.0	48.2
MAX.	71.3	70.2
MIN.	35.8	35.6

**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
09/09/01	11:52 AM	54.6		High
09/10/01	5:17 AM		36.3	Low
09/10/01	10:33 AM	62.9		High
09/11/01	4:55 AM		44.6	Low
09/11/01	10:34 AM	66.2		High
09/12/01	10:42 AM	65.9		High
09/12/01	7:10 PM		43.0	Low
09/13/01	8:54 AM	53.1		High
09/13/01	7:26 PM		39.4	Low
09/14/01	4:30 AM		40.8	Low
09/14/01	9:09 AM	58.6		High
09/15/01	9:18 AM	65.8		High
09/15/01	6:14 PM		43.6	Low
09/16/01	11:54 AM	65.3		High
09/16/01	7:08 PM		34.2	Low
09/17/01	8:39 AM	52.9		High
09/17/01	7:12 PM		34.5	Low
09/18/01	3:40 AM		34.2	Low
09/18/01	9:39 AM	57.8		High
09/19/01	9:39 AM	62.2		High
09/19/01	8:04 PM		42.7	Low
09/20/01	3:39 AM		42.0	Low
09/20/01	9:44 AM	65.7		High
09/21/01	9:58 AM	64.3		High
09/21/01	8:23 PM		43.6	Low
09/22/01	9:58 AM	68.1		High
09/22/01	6:42 PM		44.4	Low
09/23/01	3:14 AM		45.0	Low
09/23/01	10:58 AM	67.3		High
09/24/01	3:53 AM		45.3	Low
09/24/01	10:55 AM	66.3		High
09/25/01	11:25 AM	69.1		High
09/25/01	8:27 PM		44.8	Low
09/26/01	1:17 PM	67.8		High
09/26/01	7:34 PM		44.6	Low
09/27/01	10:47 AM	65.8		High
09/27/01	7:28 PM		44.5	Low
09/28/01	5:00 AM		42.8	Low
09/28/01	10:24 AM	66.4		High
09/29/01	8:42 AM	59.2		High
09/29/01	6:41 PM		40.1	Low
09/30/01	4:16 AM		39.9	Low
09/30/01	11:23 AM	63.8		High
10/01/01	5:31 AM		40.8	Low
10/01/01	12:30 PM	65.1		High
10/02/01	9:06 AM	57.8		High

	Sep-01	SUMMARY
	HIGH	LOW
AVG.	62.2	40.0
MAX.	69.1	47.8
MIN.	45.6	21.2



**ENERGY WEST MINING COMPANY  
EAST MOUNTAIN WEATHER STATION  
2001 WATER YEAR**

DATE	TIME	HIGH	LOW	
10/02/01	7:03 PM		40.1	Low
10/03/01	4:43 AM		42.4	Low
10/03/01	10:37 AM	56.5		High
10/04/01	2:42 AM		39.7	Low
10/04/01	7:50 AM	46.9		High

# **APPENDIX N**

## **2001**

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

***I. MONITORING LOCATIONS***

**A. Surface Water Hydrology** (see Map HM-1 for East Mountain / Map 7-1 and 7-2 for Trail Mountain locations listed below)

**1. Cottonwood Creek Drainage System**

**a. Cottonwood Canyon Creek**

- (1) SW-1 - Above Trail Mtn. Mine  
(Approximately 5000 feet upstream from the inlet culvert for the disturbed area.) 2150 feet South, 2000 feet East of the Northwest corner of Section 24, Township 17 South, Range 6 East.
- (2) SW-2 - Below Trail Mtn. Mine  
(Approximately 200 feet downstream from the outlet culvert for the disturbed area.) 1300 feet South, 1750 feet West of the Northeast corner of Section 25, Township 17 South, Range 6 East.
- (3) CCC01 - USGS Flume:  
(Approximately 7800 feet downstream from the outlet culvert for the disturbed area.) 1500 feet North, 200 feet East of the Southwest corner of Section 31, Township 17 South, Range 7 East.
- (4) SW-3 - Below Trail Mtn. Mine  
(Approximately 3800 feet above confluence with Straight Canyon) 2400 feet South, 2400 feet East of the Northeast corner of Section 6, Township 18 South, Range 6 East.

**b. Unnamed Drainage off Straight Canyon**

- (1) T-19  
(Approximately 200 feet upstream from the from confluence with Straight Canyon) 2500 feet South, 1100 feet East of the Northeast corner of Section 3, Township 18 South, Range 6 East

**PACIFICORP**  
**ENERGY WEST**  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

c. Grimes Wash

(1) GWR01 - Right Fork:

(Approximately 1500 feet upstream from the inlet culvert for the disturbed area.) 550 feet North, 1500 feet West of the Southwest corner of Section 22, Township 17 South, Range 7 East.

(2) GWR02 - Left Fork:

(Approximately 50 feet upstream from the inlet culvert for the disturbed area.) 200 feet South, 2350 feet East of the Northwest corner of Section 27, Township 17 South, Range 7 East.

(3) GWR03 - Below the mine:

(Approximately 500 feet downstream from the outlet culvert below the disturbed area.) 1770 feet South, 1820 feet West of the Northeast corner of Section 27, Township 17 South, Range 7 East.

2. **Huntington Creek Drainage System**

a. Huntington Creek

(1) HCC01 - Above Deer Creek Confluence:

1400 feet north, 2200 feet west of the southeast corner of Section 36, Township 16 South, Range 7 East.

(2) HCC02 - Below Deer Creek Confluence:

300 feet north, 300 feet west of the southwest corner of Section 31, Township 16 South, Range 8 East.

(3) HCC03 - Below Huntington Power Plant:

2500 feet north, 1500 feet east of the southeast corner of Section 6, Township 17 South, Range 8 East.

(4) HCC04 - @ Research Farm\*

800 feet north, 200 feet east of the southwest corner of Section 5, Township 17 South, Range 8 East.

\* Not listed on map due to scale.

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

- b. Deer Creek
  - (1) DCR01 - Above the mine:  
(Approximately 600 feet upstream from the mine facility.) 200 feet North, 800 feet West of the Southeast corner of Section 10, Township 17 South, Range 7 East.
  - (2) DCR04 - Near C1/C2 Belt Intersection:  
(Approximately 5,000 feet downstream from the mine facility.) 300 feet North, 2000 feet East of the Southeast corner of Section 2, Township 17 South, Range 7 East.
  - (3) DCR06 - @ Huntington Creek Confluence:  
(Approximately 15,000 feet downstream from the facility) 1400 feet north, 1100 feet east of the southeast corner of Section 36, Township 16 South, Range 7 East.
- c. Meetinghouse Canyon - South Fork:  
(Approximately 200 feet upstream from the north and south convergence.) 800 feet North, 1500 feet East of the Southwest corner of Section 35, Township 16 South, Range 7 East.
- d. Rilda Canyon:
  - (1) RCF-1 - Rilda Canyon - Right Fork:  
(Approximately 4000 feet upstream from the Right and Left fork convergence.) 400 feet South, 200 feet West of the Northeast corner of Section 30, Township 16 South, Range 7 East.
  - (2) RCLF1 - Rilda Canyon - Left Fork, below Rilda Canyon Portals: (Approximately 200 feet upstream from the Right and Left fork convergence.) 2400 feet North, 2100 feet West of the Southeast corner of Section 29, Township 16 South, Range 7 East.
  - (3) RCLF2 - Rilda Canyon - Left Fork, above Rilda Canyon Portals: (Approximately 1600 feet upstream from the Right and Left fork convergence.) 1600 feet North, 2300 feet West of the Southwest corner of Section 29, Township 16 South, Range 7 East.

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

- (4) RCF2 - Rilda Canyon - Above NEWUA springs: 2500 feet South, 400 feet West of the Northeast corner of Section 29, Township 16 South, Range 7 East.
    - (5) RCF3 - Rilda Canyon - Below NEWUA springs: 2550 feet South, 1000 feet East of the Northeast corner of Section 28, Township 16 South, Range 7 East.
    - (6) RCW4 - Rilda Canyon: (Approximately 1000 feet upstream from the confluence with Huntington Creek.) 850 feet North, 1900 feet West of the Southeast corner of Section 26, Township 16 South, Range 7 East.
  - e. Mill Fork Canyon:
    - (1) MFA01 - Mill Fork Canyon - Above Old Mine: (Approximately 2000 feet above old mine portals @ end of USFS development road.) 100 feet North, 1500 feet West of the Southeast corner of Section 17, Township 16 South, Range 7 East.
    - (2) MFB02 - Mill Fork Canyon - Above Huntington Creek Confluence: (Approximately 200 feet above confluence with Huntington Creek @ culvert outfall.) 100 feet South, 1900 feet East of the Northwest corner of Section 22, Township 16 South, Range 7 East.
3. Reclamation Monitoring: Following stage 1 final reclamation backfilling and grading monitoring will be conducted at points immediately above and below the last sediment pond(s).

**PACIFICORP**  
**ENERGY WEST**  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

**B. Groundwater Hydrology**

**1. East Mountain Springs (see maps HM-4 and HM-5)**

Burnt Tree *	80-41
Elk Spring *	80-43
Sheba Springs *	80-44*
Ted's Tub	80-46*
79-2	80-47
79-10 *	80-48
79-15	80-50
79-23 *	82-51
79-24	82-52*
79-26 *	84-56*
79-28 (Flag Lake)	89-60(Alpine Spring)
79-29 *	89-61
79-32	89-65
79-34	89-66
79-35 *	89-67
79-38	89-68
79-40	Rilda Canyon-(Meters 2&3)

\* Recession Study Springs (Flow August & September)

**2. Trail Mountain Springs (see Trail Mountain Spring Map 7-1)**

T-6  
T-8  
T-9  
T-10  
T-14  
T-15  
T-16  
T-18 (Oliphant Mine Discharge)

**PACIFICORP**  
**ENERGY WEST**  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

**3. Piezometric Data**

a. Surface

(1) Rilda Canyon (see Map HM-1 for locations)

P1

P5

P6

P7

EM-47

(2) Cottonwood Canyon Creek (see Map HM-1 for locations)

EM-31

CCCW-1A

CCCW-1S

CCCW-2A

CCCW-3A

CCCW-3S U

CCCW-3S L

TM-1B

TM-3

b. Underground: In-Mine

(1) Deer Creek Mine (Refer to Annual Hydrologic Reports for  
Locations : HM-2)

**4. In-Mine Water Locations**

a. Deer Creek Mine (Refer to Annual Hydrologic Reports for Locations  
: HM-2)

b. Wilberg/Cottonwood Mines (Refer to Annual Hydrologic Reports  
for Locations : HM-3)

c. Trail Mountain Mine (Refer to Annual Hydrologic Reports for  
Locations : PLATE 7-3)

**5. Waste Rock Wells (see Map HM-1 for locations)**

a. Deer Creek

b. Cottonwood



**PACIFICORP**  
**ENERGY WEST**  
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DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

**C. UPDES Monitoring Locations**

- a. Deer Creek Mine  
UPDES UT0023604  
001- Sediment Pond  
002- Mine Discharge
- b. Des-Bee-Dove Mines  
UPDES UTG040022  
001- Sediment Pond
- c. Wilberg/Cottonwood Mines  
UPDES UT0022896  
001- Mine Discharge @ Cottonwood Canyon (TMA)  
002- Sediment Pond Discharge @ Cottonwood Canyon  
003- Sediment Pond @ Mine Facilities  
004- Mine Discharge @ Miller Canyon  
005- Sediiment Pond Discharge @ Waste Rock Site
- d. Trail Mountain Mine  
UPDES UT0023728  
001- Sediment Pond  
002- Mine Discharge

**PACIFICORP**  
**ENERGY WEST**  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

**II.     *MONITORING SCHEDULE (see enclosed monitoring table)***

**A.     Field Measurements**

Field Measurements collected during quality sampling: Listed below are the sites which will be monitored by PacifiCorp - Energy West in accordance with the guidelines established by DOGM; i.e.,

- Date and Time
- Flow
- pH
- Temperature
- Conductivity
- Dissolved oxygen (perennial streams only)

**Surface Monitoring**

Surface monitoring locations will be field monitored quarterly for all field parameters.

**1.     Cottonwood Canyon Creek**

- a.     (1) SW-1
- (2) SW-2
- (3) Cottonwood Canyon Creek - USGS Flume
- (4) SW-3
- b.     Grimes Wash
- (1)    GWR01
- (2)    GWR02
- (3)    GWR03
- c.     Straight Canyon
- (1)    T-19 ( Unnamed Side Drainage)

**2.     Huntington Canyon Drainage**

- a.     Deer Creek
- (1)    DCR01
- (2)    DCR04
- (3)    DCR06

**PACIFICORP**  
**ENERGY WEST**  
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**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

b.     Huntington Creek

- (1)    HCC01
- (2)    HCC02
- (3)    HCC04

Flow in Huntington Creek is measured only at HCC01 by Utah Power , and will be reported in the Annual Hydrologic Report.

c.     Meetinghouse Canyon - South Fork

d.     Rilda Canyon

- (1)    RCF1\*
- (2)    RCLF 1
- (3)    RCLF 2
- (4)    RCF2
- (5)    RCF3
- (6)    RCW4

\* Baseline flow will be measured adjacent to EM-163

e.     Mill Fork Canyon

- (1)    MFA01
- (2)    MFB02

**Groundwater Monitoring**

- 1.     East Mountain Springs (see monitoring location list)
- 2.     Trail Mountain Springs (see monitoring location list)

East/Trail Mountain Springs will be field monitored during the months of July and October. In addition, the East Mountain Recession Study Springs (denoted by asterisks in the Monitoring Location section) and Trail Mountain Springs will be field monitored for flow only from July through October. T-18: Oliphant Mine Discharge, will be collected and analyzed quarterly. Rilda Canyon Springs - NEWUA (meters 2 & 3) will be field monitored monthly depending upon access.

3.     In-Mine

- a.     Deer Creek
- b.     Wilberg/Cottonwood
- c.     Trail Mountain

In-mine locations will be field monitored quarterly for all field parameters except pH, conductivity, and dissolved oxygen.

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

4. Piezometric Wells

a. Surface

Piezometric surface wells will be field monitored for level only on a monthly basis depending upon access.

(1) Rilda Canyon (see Map HM-1 for locations)

P1

P5

P6

P7

EM-47

(2) Cottonwood Canyon Creek (see Map HM-1 for locations)

EM-31

CCCW-1A

CCCW-1S

CCCW-2A

CCCW-3A

CCCW-3S U

CCCW-3S L

TM-1B

TM-3

5. Waste Rock Wells

a. Deer Creek

b. Cottonwood

**UPDES Monitoring**

1. Deer Creek
2. Des-Bee-Dove
3. Wilberg/Cottonwood
4. Trail Mountain

UPDES sites will be monitored as specified in the individual permits.

**Reclamation Monitoring**

Surface Water Resources: (see enclosed monitoring table)

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

Surface monitoring locations will be field monitored monthly for flow and all field parameters quarterly until bond release.

Ground Water Resources: (see enclosed monitoring table)

**Springs** East/Trail Mountain Springs will be field monitored during the months of July and October.

Rilda Canyon Springs NEWUA (meters 2 & 3) will be field monitored monthly for flow depending upon access. East/Trail Mountain Springs (including Rilda Springs and T-18 [Oliphant Mine]) monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.

**Wells:** Piezometric surface wells (Rilda Canyon and Cottonwood Canyon including TM-3 in Straight Canyon): will be field monitored for level only on a monthly basis depending upon access. Piezometric surface well monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.

Waste Rock Wells and TM-1B: will be field monitored for level only on a quarterly basis. Monitoring will be conducted until sealing during Phase I reclamation.

**UPDES:** Sites will be monitored as specified in the individual permits

**PACIFICORP**  
**ENERGY WEST**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

**B. Quality Sampling** (Laboratory Measurements)

1. **Surface Water Hydrology:** Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table #1). Quarterly sampling was initiated during March 1988 and will continue throughout the year; i.e., June, September, and December. Baseline analysis was performed in 2001 and will be repeated every five years thereafter.

**a. Cottonwood Creek Drainage**

(1) Cottonwood Canyon Creek

- (a) SW-1
- (b) SW-2
- (c) SW-3

(2) Grimes Wash

- (a) GWR01
- (b) GWR02
- (c) GWR03

(3) Straight Canyon

- (a) T-19

**b. Huntington Creek Drainage**

(1) Deer Creek

- (a) DCR01
- (b) DCR04
- (c) DCR06

(2) Huntington Creek

- (a) HCC01
- (b) HCC02
- (c) HCC04

(3) Meetinghouse Canyon - South Fork: MCH01

(4) Rilda Canyon

- (a) RCF1
- (b) RCF3
- (c) RCW4

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**DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE**  
**and TRAIL MOUNTAIN MINES**

- (5) Mill Fork Canyon
  - (a) MFA01
  - (b) MFB02

**Reclamation Monitoring - Surface Water Hydrology:** Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table #1). Sampling will be conducted on a quarterly basis until bond release. Baseline analysis will be performed on the 5<sup>th</sup> and 9<sup>th</sup> years following reclamation. In no case will baseline sampling time frame exceed 5 years converting from operational to reclamation monitoring.

**2. Groundwater Hydrology**

- a. East/Trail Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Rilda Canyon Springs (NEWUA: Meters 2 & 3) and T-18 (Oliphant Mine Discharge) will be monitored for quarterly for quality. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- b. In-Mine: Two water samples will be collected and analyzed per mine quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- c. Wells: TM-1B will be sampled quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- d. Waste Rock Wells: One water sample will be collected and analyzed per location quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

Baseline analysis was performed in 2001 and will be repeated every five years thereafter.

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**and TRAIL MOUNTAIN MINES**

**Reclamation Monitoring - Groundwater Hydrology:**

- a. East/Trail Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Rilda Canyon Springs (NEWUA: Meters 2 & 3) will be monitored quarterly for quality. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2). East/Trail Mountain Springs (including Rilda Springs and T-18 [Oliphant Mine Discharge]) monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.
- b. In-Mine: Two water samples will be collected and analyzed per mine quarterly until the mine is sealed or the sites become inaccessible. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- c. Wells: Well TM-1B will be sealed during Phase I reclamation. Quarterly sampling will continue until sealing. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- d. Waste Rock Wells: Waste rock wells will be sealed during Phase I reclamation. One water sample will be collected and analyzed per location quarterly until well sealing. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).
- e. Post Reclamation Monitoring: PacifiCorp commits to conduct annual surveys to identify new discharge locations within and below sealed portals. If discharge occurs, one water sample will be collected and analyzed per location quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2). Baseline analysis will be performed on the 5<sup>th</sup> and 9<sup>th</sup> year.

**3. UPDES Monitoring Sites**

- a. Deer Creek Mine
- b. Des-Bee-Dove Mines
- c. Wilberg/Cottonwood Mines
- d. Trail Mountain Mine

UPDES sites will be monitored as specified in the individual permits.



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***III. ANNUAL REPORTS***

All data collected regarding the hydrology of East/Trail Mountain will be summarized by the applicant in an annual Hydrologic Monitoring Report. Copies of the report will be submitted to the; U.S. Forest Service; and the Utah State Division of Oil, Gas and Mining. In addition, any raw data collected will be submitted to the Utah State Division of Oil, Gas and Mining on a quarterly basis.

# PACIFICORP ENERGY WEST HYDROLOGIC MONITORING PROGRAM

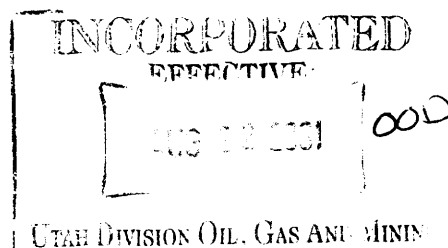
**TABLE 1**  
**SURFACE WATER (UPDES Monitoring) BASELINE, OPERATIONAL, POSTMINING**  
**WATER QUALITY PARAMETER LIST**

**Field Measurements:**

*	-	Water Level or Flow
*	-	pH
*	-	Specific Conductivity (umhos/cm)
*	-	Dissolved Oxygen (ppm) (Perennial Streams Only)
*	-	Temperature

**Laboratory Measurements: (mg/l)**

#	*	-	Total Settleable Solids (UPDES Only)
#	*	-	Total Suspended Solids
	*	-	Total Dissolved Solids
	*	-	Total Hardness (CaCO <sub>3</sub> )
		-	Acidity (CaCO <sub>3</sub> )
		-	Aluminum (Al) - Dissolved
		-	Arsenic (As) - Dissolved
		-	Boron (B) - Dissolved (Waste Rock Sites Only)
	*	-	Carbonate (CO <sub>3</sub> <sup>-2</sup> )
	*	-	Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )
		-	Cadmium (Cd) - Dissolved
	*	-	Calcium (Ca) - Dissolved
	*	-	Chloride (Cl <sup>-</sup> )
		-	Copper (Cu) - Dissolved
	*	-	Iron (Fe) - Total & Dissolved
		-	Lead (Pb) - Dissolved
	*	-	Magnesium (Mg) - Dissolved
	*	-	Manganese (Mn) - Total & Dissolved
		-	Molybdenum (Mo) - Dissolved
		-	Nitrogen: Ammonia (NH <sub>3</sub> ) - reported as N
		-	Nitrite (NO <sub>2</sub> <sup>-</sup> ) - reported as N
		-	Nitrate (NO <sub>3</sub> <sup>-</sup> ) - reported as N
	*	-	Potassium (K) - Dissolved
	*	-	Oil & Grease (UPDES & Above & Below Mine Sites Only)
		-	Ortho Phosphate (PO <sub>4</sub> <sup>-3</sup> ) - reported as P
		-	Selenium (Se) - Dissolved (Waste Rock Sites Only)
	*	-	Sodium (Na) - Dissolved
	*	-	Sulfate (SO <sub>4</sub> <sup>-2</sup> )
		-	Zinc (Zn) - Dissolved
	*	-	Cation-Anion Balance



# Construction                      \* Operational                      - Baseline

**PACIFICORP  
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HYDROLOGIC MONITORING PROGRAM**

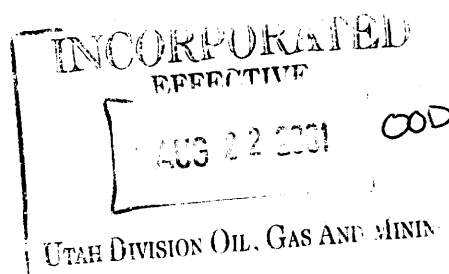
**TABLE 2  
GROUND WATER BASELINE, OPERATIONAL, POSTMINING  
WATER QUALITY PARAMETER LIST**

**Field Measurements:**

- \* - Water Level or Flow
- \* - pH
- \* - Specific Conductivity (umhos/cm)
- \* - Temperature

**Laboratory Measurements: (mg/l)**

- \* - Total Dissolved Solids
- \* - Total Hardness (CaCO<sub>3</sub>)
- Acidity (CaCO<sub>3</sub>)
- Aluminum (Al) - Dissolved
- Arsenic (As) - Dissolved
- Boron (B) - Dissolved (Waste Rock Sites Only)
- \* - Carbonate (CO<sub>3</sub><sup>-2</sup>)
- \* - Bicarbonate (HCO<sub>3</sub><sup>-</sup>)
- Cadmium (Cd) - Dissolved
- \* - Calcium (Ca) - Dissolved
- \* - Chloride (Cl<sup>-</sup>)
- Copper (Cu) - Dissolved
- \* - Iron (Fe) - Total & Dissolved
- Lead (Pb) - Dissolved
- \* - Magnesium (Mg) - Dissolved
- \* - Manganese (Mn) - Total & Dissolved
- Molybdenum (Mo) - Dissolved
- Nitrogen: Ammonia (NH<sub>3</sub>) - reported as N
- Nitrite (NO<sub>2</sub>) - reported as N
- Nitrate (NO<sub>3</sub><sup>-</sup>) - reported as N
- \* - Potassium (K) - Dissolved
- Ortho Phosphate (PO<sub>4</sub><sup>-3</sup>) reported as P
- Selenium (Se) - Dissolved (Waste Rock Sites Only)
- \* - Sodium (Na) - Dissolved
- \* - Sulfate (SO<sub>4</sub><sup>-2</sup>)
- Zinc (Zn) - Dissolved
- \* - Cation-Anion Balance
- \* Operational - Baseline



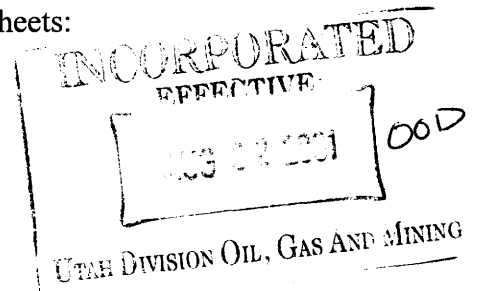
# PACIFICORP ENERGY WEST

## HYDROLOGIC MONITORING PROGRAM

### WATER SAMPLE DOCUMENTATION

The following information will be included on the lab sheets:

1. Sample time and date
2. Individual taking sample
3. Field parameters (except in-mine)
  - Temperature
  - Flow
  - pH (units)
  - Conductivity (umhos/cm)
  - Dissolved Oxygen (PPM), depending on location
4. Precipitation date if applicable
5. Date and time each parameter is analyzed at the lab



### ANALYTICAL METHOD AND DETECTION LIMIT

<u>Parameter</u>	<u>MRL</u>	<u>UNITS</u>	<u>Method</u>
Acidity	10	mg/l CaCO <sub>3</sub>	D1067-92
Alkalinity, Bicarbonate	5	mg/l HCO <sub>3</sub> <sup>-</sup>	EPA 310.1
Alkalinity, Carbonate	5	mg/l CO <sub>3</sub> <sup>-2</sup>	EPA 310.1
Alkalinity, Total	5	mg/l CaCO <sub>3</sub>	EPA 310.1
Aluminum	1	mg/l	EPA 202.1
Anions	----	meq/l	-----
Arsenic	.01	mg/l	EPA 206.2
Barium	1	mg/l	EPA 208.1
Boron	.1	mg/l	EPA 212.3
Cadmium	.01	mg/l	EPA 213.1
Calcium	1	mg/l	EPA 215.1
Cations	----	meq/l	-----
Chloride	1	mg/l	EPA 300.0
Chromium	0.1	mg/l	EPA 218.1
Conductivity	1	umhos/cm	SM2510-B
Copper	0.1	mg/l	EPA 220.1
Fluoride	0.1	mg/l	SM4500 F-C
Hardness, Total	----	mg/l CaCO <sub>3</sub>	SM2340-B
Iron	0.1	mg/l	EPA 236.1
Iron, Dissolved	0.1	mg/l	EPA 236.1
Lead	0.1	mg/l	EPA 239.1
Magnesium	1	mg/l	EPA 242.1
Manganese	0.1	mg/l	EPA 243.1
Mercury	.0002	mg/l	EPA 245.1
Nickel	0.1	mg/l	EPA 249.1
Nitrogen, Ammonia	0.5	mg/l	EPA 350.3
Nitrogen, Nitrate	0.1	mg/l	EPA 300.0
Nitrogen, Nitrite	0.01	mg/l	EPA 300.0
Oil & Grease	2	mg/l	EPA 413.1
Oxygen, Dissolved	----	mg/l	EPA 360.1
pH	----	Units	EPA 150.1
Phosphorus, Total	.05	mg/l	EPA 300.0
Potassium	1	mg/l	EPA 258.1
Selenium	.01	mg/l	EPA 270.2
Sodium	1	mg/l	EPA 273.1
Solids, Settleable	.5	ml/l	EPA 160.5
Solids, Total Dissolved	10	mg/l	EPA 160.1
Solids, Total Suspended	5	mg/l	EPA 160.2
Sulfate	5	mg/l	EPA 300.0
Sulfide	1	mg/l	EPA 376.1
Turbidity	.1	NTU	EPA 180.1
Zinc	.01	mg/l	EPA 289.1

## PACIFICORP

## ENERGY WEST MINING COMPANY

## HYDROLOGIC MONITORING PROGRAM

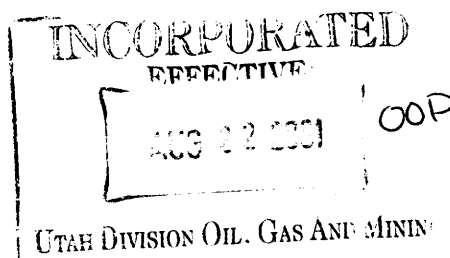
## DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL MOUNTAIN MINES

## SURFACE HYDROLOGY - OPERATIONAL SAMPLING (Table 1)

Drainage System	Drainage Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cottonwood Creek Drainage System	SW1	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	SW2	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	CCC01	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field
	SW3	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
Grimes Wash Drainage System	GWR01	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	GWR02	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	GWR03	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
Straight Canyon	T-19	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
Deer Creek Drainage System	DCR01	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	DCR04	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	DCR06	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
Huntington Creek Drainage System	HCC01	Flow *	Flow *	Operational *	Flow *	Flow *	Operational *	Flow *	Flow *	Operational *	Flow *	Flow *	Operational *
	HCC02			Operational *			Operational *			Operational *			Operational *
	HCC04			Operational *			Operational *			Operational *			Operational *
Meetinghouse Canyon	MCH01	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
Rilda Canyon	RCF1*	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	RCLF1	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field
	RCLF2	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field
	RCF2	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field
Mill Fork Canyon	RCF3	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	RCW4	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
MFA01		Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational
	MFB02	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational	Flow	Flow	Operational

\* Flow in Huntington Creek is measured @ HCC01 by Utah Power, and will be reported in the Annual Hydrologic Report

\* Baseline flow will be measured adjacent to EM-163



**ENERGY WEST MINING COMPANY  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL**

## GROUNDWATER HYDROLOGY - OPERATIONAL SAMPLING (Table 2)

[illegible]

**UPDES SAMPLING - (Table 1)**

[illegible]

INCORPORATED  
EXECUTIVE  
[Sediment Pool Discharge 2001]  
UTAH DIVISION OIL, GAS AND MIN

## PACIFICORP

## ENERGY WEST MINING COMPANY

## HYDROLOGIC MONITORING PROGRAM

## DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL MOUNTAIN MINES

## SURFACE HYDROLOGY - BASELINE SAMPLING (Table 1) - 2001

Drainage System	Drainage Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cottonwood Creek Drainage System	Cottonwood Canyon SW1	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
	SW2	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
	Cottonwood Creek CCC01	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field	Flow	Flow	Field
	SW3	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
Grimes Wash	GWR01	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
	GWR02	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
	GWR03	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
Straight Canyon	T-19	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline

## Deer Creek

DCR01	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
DCR04	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
DCR06	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow

## Huntington Creek Drainage System

HCC01	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *
HCC02	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *
HCC04	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *	Flow *

\* Flow in Huntington Creek is measured @ HCC01 by Utah Power, and will be reported in the Annual Hydrologic Report

## Meetinghouse Canyon

MCH01	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
-------	------	------	------	------	------	------	------	------	------	------	------	------	------

## Rilda Canyon

RCF1*	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
RCLF1	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
RCLF2	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
RCF2	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
RCF3	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
RCW4	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow

\* Baseline flow will be measured adjacent to EM-163

## Mill Fork Canyon

MFA01	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
MFB02	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow

UTAH DIVISION OIL, GAS AND MINING

**PACIFICORP**  
**ENERGY WEST MINING COMPANY**  
**HYDROLOGIC MONITORING PROGRAM**  
**DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL MOUNTAIN MINES**

**GROUNDWATER HYDROLOGY - BASELINE SAMPLING (Table 2) - 2001**

Groundwater Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Springs	East Mountain							Baseline	Flow *	Flow *	Baseline		
	East Mountain-Rilda Canyon	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline	Flow	Flow	Baseline
	Trail Mountain							Baseline	Flow	Flow	Baseline		
In-Mine	Cottonwood			Baseline			Baseline			Baseline			Baseline
	Deer Creek			Baseline			Baseline			Baseline			Baseline
	Trail Mountain			Baseline			Baseline			Baseline			Baseline
	Oliphant			Baseline			Baseline			Baseline			Baseline
Wells	Cottonwood Waste Rock Well			Baseline			Baseline			Baseline			Baseline
	Cottonwood Canyon Wells	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
	(includes Straight Canyon TM-3)												
	Deer Creek Waste Rock Well			Baseline			Baseline			Baseline			Baseline
	Deer Creek In-Mine Well			Level			Level			Level			Level
	Rilda Canyon Wells	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
	Trail Mountain (TM-1B)	Level	Level	Baseline	Level	Level	Baseline	Level	Level	Baseline	Level	Level	Baseline

**UPDES SAMPLING - (Table 1)**

[illegible]

Dec 1934  
Trail  
Cott  
Dec 1934  
Dis-  
Trail

**INCORPORATED**  
**EFFECTIVE**

**Sediment Pond**  
**Discharge**

0

UTAH DIVISION OF OIL, GAS AND MINES



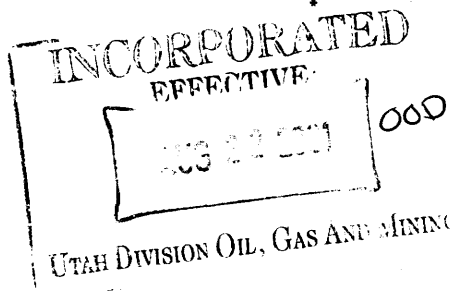
## PACIFICORP

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HYDROLOGIC MONITORING PROGRAM  
DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL MOUNTAIN MINES

## SURFACE HYDROLOGY - RECLAMATION SAMPLING (Table 1)

Drainage System	Drainage Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cottonwood Creek Drainage System *	Cottonwood Canyon	SW1	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
	Creek	SW2	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		CCC01	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field
		SW3	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
	Grimes	GRW01	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
	Wash	GRW02	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		GRW03	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
	Straight Canyon	T-19	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
Deer Creek		DCR01	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		DCR04	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		DCR06	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
Huntington Creek		HCC01	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**
		HCC02	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**
		HCC04	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**	Operational**
** Flow in Huntington Creek is measured @ HCC01 by Utah Power, and will be reported in the Annual Hydrologic Report													
Meetinghouse Canyon		MCH01	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
Rilda Canyon		RCF1***	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		RCLF1	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field
		RCLF2	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field
		RCF2	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field	Field
		RCF3	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
		RCW4	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
*** Baseline flow will be measured adjacent to EM-163													
Mill Fork Canyon		MFA01	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
		MFB02	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow

\* Analyzed for Baseline Parameters During the Fifth (5) and Ninth (9) Year After Final Reclamation  
In no case will baseline sampling time frame exceed 5 years converting from operational to reclamation monitoring.

Huntington  
Drainage  
System \*

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**ENERGY WEST MINING COMPANY  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK/COTTONWOOD-WILBERG/DES-BEE-DOVE/TRAIL MOUNTAIN MINES  
GROUNDWATER HYDROLOGY - RECLAMATION SAMPLING (Table 2)**

Groundwater Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Springs</b>	<b>East Mountain</b>												
	<i>Spring monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.</i>												
	<b>East Mountain-Rilda Canyon</b>		Flow	Operational	Flow	Flow	Operational	Flow	Operational		Flow	Flow	Operational
	<i>Rilda Spring monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.</i>												
<b>In-Mine</b>	<b>Trail Mountain</b>												
	<i>Spring monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.</i>												
<b>Wells</b>	<b>Deer Creek/Cottonwood/Trail Mtn. samples will be collected and analyzed quarterly until the mine is sealed or the sites become inaccessible</b>												
	<b>Oliphant</b>												
	<b>T-18</b>												
	<i>Oliphant Mine discharge monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.</i>												
	<b>Cottonwood Waste Rock Well</b>												
	<i>Cottonwood Waste Rock Well will be sealed during Phase I reclamation. One water sample will be collected and analyzed per location quarterly until well sealing</i>												
<b>UPDES SAMPLING - (Table 1)</b>	<b>Cottonwood Canyon Wells*</b>												
	<b>(includes Straight Canyon TM-3)</b>												
	<i>Cottonwood Canyon well monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.</i>												
	<b>Deer Creek Waste Rock Well</b>												
<b>Sediment Pond Discharge**</b>	<b>Cottonwood</b>												
	<b>WMD01</b>												
	<b>Miller</b>												
	<b>DCD</b>												
<b>Trail Mountain</b>	<b>TMD</b>												
	<b>3 Outfalls</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
<b>Des-Bee-Dove Trail Min</b>	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												

**UPDES SAMPLING - (Table 1)**

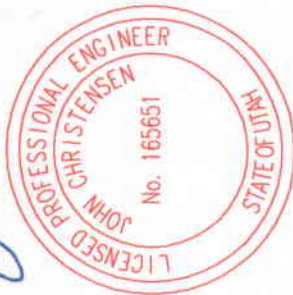
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Mine Water Discharge**</b>	<b>Cottonwood</b>												
	<b>WMD01</b>												
	<b>Miller</b>												
	<b>DCD</b>												
<b>Trail Mountain</b>	<b>TMD</b>												
	<b>3 Outfalls</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
<b>Des-Bee-Dove Trail Min</b>	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												
	<b>1 Outfall</b>												

**INCORPORATED**  
EFFECTIVE  
AUG 22 2001  
UTAH DIVISION OIL, GAS AND MINING

I, JOHN CHRISTENSEN BEING A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF UTAH, DO HEREBY CERTIFY THAT THE INFORMATION CONTAINED ON THIS DRAWING IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

*John Christensen* 2/12/102  
DATE

JOHN CHRISTENSEN NO. 165651



SCALE: 1"=2000'



MINE SEALED MAY 2001

# **TRAIL MOUNTAIN MINE UNDERGROUND WATER MONITORING LOCATIONS**

**PLATE 7-3**

**RECEIVED**

APR 02 2002

DIVISION OF  
OIL, GAS AND MINING

